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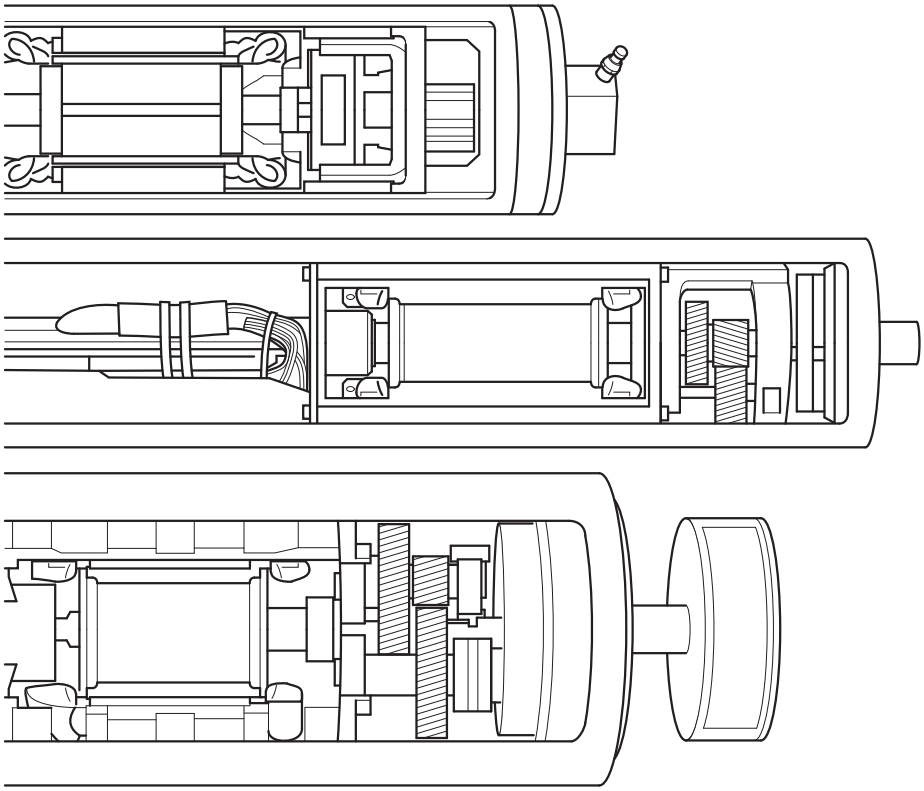

User manual

Interroll Drum Motors

S-series

i-series

E-series

D-series

Version 2.3 (02/2011) en
Original instructions

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Version 2.3 (02/2011) en
Original instructions

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Introduction

Handling of the user manual

This manual covers the following Drum Motor types:

- 80S, 113S
- 80i, 113i, 138i, 165i, 216i, 217i, 315i
- 113E
- SN062D-082, SN062D-102, SN062D-113

Contents of the manual

This manual contains important advice, notices, and information about the Drum Motor in all phases of its lifecycle:

- Transport, assembly, and commissioning
- Safe operation, maintenance, troubleshooting and disposal

Validity of the manual

The manual describes the Drum Motor as it is delivered by Interroll.

Special application designs require validation from Interroll and additional technical instructions.

This manual is part of the product

- ➢ For trouble-free and safe operation, and warranty claims, read this manual and follow the instructions before handling the Drum Motor.
- ➢ Keep this manual near the Drum Motor.
- ➢ Pass this manual on to any subsequent operator or occupant of the Drum Motor.
- ➢ Interroll does not accept any liability for malfunctions or defects due to failure of observe this manual.
- ➢ If you have any questions after reading this user manual, feel free to contact our customer service. See the last page for contact information.

Warnings in this manual

The warnings in this document refer to risks which may arise while using the Drum Motor. For relevant warnings, *see "Safety", page 5* and the warnings at the beginning of each chapter.

There are three categories of danger. The following signal words are used in the document as required:

- Danger
- Warning
- Caution

Signal word	Meaning
Danger	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
Warning	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
Caution	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

Structure of warnings

⚠ DANGER

Nature and source of the hazard
Possible consequence of non-observance

➢ Information about how to avoid the hazard.

Additional symbols

NOTICE

This symbol identifies possible material damage.
➢ Information about how to avoid damage.

This symbol displays safety instructions.

This symbol marks useful and important information.

➢ This symbol marks the steps that have to be carried out.

Safety

General safety instructions

The Drum Motor is designed according to the technical state of the art and is reliable in operation, once distributed. However, risks may still arise.

- Risks of physical injury to the user or bystanders.
- Adverse effects of the Drum Motor and other material.

Disregarding the warnings in this manual may lead to serious injury.

- ➢ Always read the entire operating and safety instructions before starting to work with the Drum Motor and follow the information contained herein in full.
- ➢ Only instructed and qualified persons may work with the Drum Motor.
- ➢ Always keep this user manual at hand when working on the Drum Motor so that you can consult it quickly if required.
- ➢ Always comply with relevant national safety regulations.
- ➢ If you have any questions after reading this user manual, feel free to contact our customer service. See the last page for contact information.

Intended use

The Drum Motor may be used for applications in industrial environments, supermarkets, and airports to convey goods such as parts, cartons, totes, bulk material such as granular, powder and any other freeflowing material. It must be integrated in a conveyor module or a conveying system. Any other use is considered inappropriate.

Use of the Drum Motor is only allowed in the areas described under product information.

Any changes that affect the safety of the product are not allowed.

The Drum Motor may only be used within the given operation limits.

Unintended use

The Drum Motor may not be used to transport persons.

The Drum Motor is not intended for use under impact or shock loads.

The Drum Motor is not intended for underwater use. Water ingress will eventually occur causing a short circuit or damage to the motor.

The Drum Motor may not be used as a driving pulley for cranes, lifts or their associated lifting ropes, cables and chains.

Applications not according to the intended use of the Drum Motor require approval from Interroll.

Interroll and their distributors will accept no liability for damage or failure of the product due to use outside the specifications and limitations (see chapter "Electrical data" of the respective series) unless otherwise specified in a quotation and/or writing.

Qualified persons

Qualified persons are persons who read and understand the manual and, taking national regulations into account, can competently execute incidental work.

Only instructed and qualified persons may work with the Drum Motor, taking the following into account:

- the relevant manuals and diagrams,
- the warning and safety instructions in this manual,
- the system specific regulations and requirements,
- national or local regulations and requirements for safety and accident prevention.

Risks

The following list informs you about the various types of danger or damage that may occur while working with the Drum Motor.

Persons

- ➢ Maintenance or repair work must only be performed by authorized and qualified persons in accordance with the applicable regulations.
- ➢ Before turning on the Drum Motor, ensure that no unauthorized persons are near the conveyor.

Electricity

- ➢ Only perform installation and maintenance work after you have switched off the power. Ensure that the Drum Motor cannot be turned on accidentally.

Oil

- ➢ Do not swallow the oil. The used oil is expected to be of low toxicity, but it can contain harmful substances. Ingestion may result in nausea, vomiting and/or diarrhoea. In general no treatment is necessary unless large quantities are swallowed. However, get medical advice.
- ➢ Avoid contact with skin and eyes. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
- ➢ If oil is spilt, use appropriate containment to avoid environmental contamination and clean the contaminated area as soon as possible to avoid slippery surfaces. Properly dispose of any contaminated rags or cleaning materials in order to prevent spontaneous combustion and or fire.
- ➢ If the oil burns, use foam, water spray or fog, dry chemical powder, or carbon dioxide to extinguish a fire. Do not use water in a jet. Wear proper protective equipment including breathing apparatus.
- ➢ Observe the complete safety data sheet which can be found at www.interroll.com.

Rotating parts

- ➢ Do not insert fingers between the Drum Motor and any sort of belt or roller chain.
- ➢ Tie up long hair.
- ➢ Do not wear loose clothing.
- ➢ Remove jewellery such as bracelets or wristbands.

Hot parts

- ➢ Do not touch the surface of the Drum Motor. Even normal operating temperature can cause skin burnings.

Working environment

- ➢ Do not use the Drum Motor in explosive atmospheres.
- ➢ Remove equipment or material which is not required from the workspace.
- ➢ Always wear safety shoes.
- ➢ Clearly specify and monitor the way goods are placed on the conveyor.

Avoiding malfunctions in operation

- Regularly check the Drum Motor for visible damage.
- In case of fumes, unusual noise or blocked or damaged goods, stop the Drum Motor at once and ensure that the Drum Motor cannot be started accidentally.
- Contact qualified personnel immediately to find the source of the malfunction.
- During operation do not step on the Drum Motor or on the conveyor/machine in which it is installed.

Maintenance

- As the product is maintenance free, you only need to check regularly for visible damages, unusual noise and that the fixings, screws and nuts are still tightened.
- Do not open the Drum Motor.

Accidental motor starts

- Use caution while installing or maintaining the Drum Motor, or while it is under error conditions, since it may start accidently.

Interfaces

By assembling the Drum Motor in a conveyor module, potential hazards may occur. These are not described in this manual and must be analyzed during the design, installation, and startup of the conveyor module.

- After assembling the Drum Motor in a conveyor module or other similar equipment, check the whole system for any new potential dangerous condition prior to turning on the equipment.

General technical information

Product description

The Drum Motor is a totaly enclosed electric driven pulley and replaces external components such as gear-motors and gearboxes that require frequent maintenance.

The Drum Motor can operate in high concentrations of dust or grit and can be subjected to water jets or spray and will withstands most aggressive environments. Due to its IP66 or IP69k protection class and its stainless steel finish (when specified) it can also be used for food processing, hygienic or pharmaceutical applications. The Drum Motor can be used with a rubber lagging for increasing friction between the Drum Motor and conveyor belt or provided with a profiled lagging for driving modular or profiled belts or without any covering.

S-, i-, and E-series Drum Motors are powered by an asynchronous AC induction motor which is available in different power levels and in accordance to most international voltages.

D-series Drum Motors are powered by a synchronous motor and must be connected to a suitable drive controller. For information on the drive controller see the respective manual.

The Drum Motor contains oil that serves as lubricant and coolant by dissipating heat through the drum shell and conveyor belt.

If the Drum Motor is used without a belt or with modular belt it can be provided in a special design to ensure cooling.

Optional features

Integral Thermal Control/Thermal Winding Protection: An Integral Thermal Control switch is fitted in the winding head to prevent overheating. The switch will open if the motor overheats. However, it must be connected to a suitable external control device which will interrupt the power supply to the motor in case of overheating (*see "Thermal protector", page 10*).

Integral Electromagnetic Brake: The Integral Electromagnetic Brake is able to brake and hold a load according to the stated belt pull. It is applied directly to the Drum Motor's rotor shaft and supplied with a DC rectifier. The Electromagnetic Brake is available for all Drum Motor models except 80s and 113s (*see "Electromagnetic brake for i- and E-series", page 70*).

Mechanical Backstop Function: The Mechanical Backstop Function fitted to the rotor shaft can be used on inclined conveyors to prevent the belt from moving backwards when power supply is off. The Mechanical Backstop Function is available for all Drum Motor models except 113s and D-series.

Encoder solution: The pulses of the Encoder can be used for positioning, speed and rotational direction control (*see "Options and accessories", page 70*).

Technical data

Protection classification	IP66
Ambient temperature range for normal applications [1)]	+5 °C to +40 °C
Ambient temperature range for low temperature applications [1)]	-25 °C to +15 °C
Ambient temperature range for de-rated drum motors [1)]	+5 °C to +25 °C
Cycle times	max. 3 starts/stops per minute Higher cycle times possible with variable frequency drive (VFD) or special design
Installation altitude above sea level	max. 1000 m

[1)] Depending on the ambient temperature, different oil types may be required (*see "List of oil types", page 98*). For ambient temperatures under +5 °C anti-condensation heating is recommended. Under -20 °C special shaft seals and cable are required.

Product identification

To identify a Drum Motor, the following information is required. You may enter the values of your Drum Motor in the last column.

Information	Possible value	Own value
Drum Motor label	Motor type Speed in m/s Serial number Shell length in mm No. of poles Power in kW	
Shell (tube) diameter	e.g. 112.3 ends of drum 113.3 middle of drum	
Lagging material	e.g. Rubber Thickness Profile	

Thermal protector

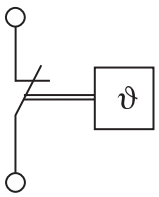
The thermal control protection switch fitted inside the stator coil is closed under normal running conditions. If the motor overheats, the switch will open at a preset temperature (depending on the winding insulation class) before damage to the motor can occur.

⚠ WARNING

The switch automatically re-sets when the motor has cooled down
Unintentional start of the motor

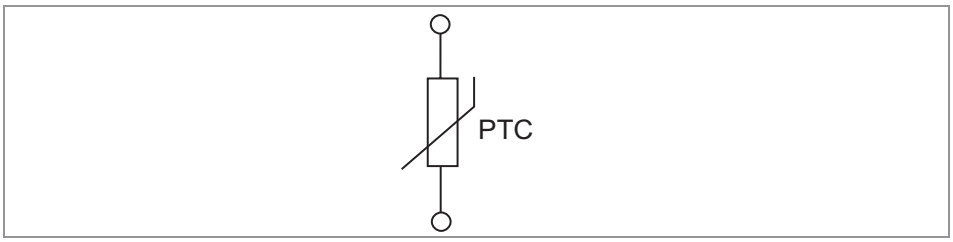
- Connect the switch to a suitable relay or contactor to ensure disconnection of the power supply to the motor when tripped.
- When the switch has tripped, wait until the motor has cooled down and ensure that no persons are endangered before restarting the motor.

Standard version: Temperature limiter, automatically resetting



Lifetime: 10 000 cycles			
AC	cos φ = 1	2.5 A	250 VAC
	cos φ = 0.6	1.6 A	250 VAC
DC		1.6 A	24 VDC
		1.25 A	48 VDC
Lifetime: 2 000 cycles			
AC	cos φ = 1	6.3 A	250 VAC
Back setting temperature		40 K ± 15 K	
Resistance		< 50 mΩ	
Contact bounce time		< 1 ms	

Optional version: PTC (positive temperature coefficient resistor)



Maximum operating voltage		V	25
Thermal time constant		s	< 10
Resistance at switching temperature	+ 15 K	Ω	1330 ... 4000
	+ 5 K	Ω	550 ... 1330
		Ω	550
	- 5 K	Ω	250 ... 550
	- 20 K	Ω	< 250

It is advisable to connect the motor through a conventional external thermal current overload relay/contactor especialy when the motor is not equipped with an internal thermal coil protection.

Use of 50 Hz motors in a 60 Hz net supply

This option is not applicable for D-series.

Effect using 50 Hz rated motor in a 60 Hz net supply with the same voltage

Motor rated: 230/400 V - 3 ph - 50 Hz
Net supply: 230/400 V - 3 ph - 60 Hz

Using a 50 Hz motor in a 60 Hz net will increase the frequency and therefore the speed by 20%. If the rated motor parameters are to be kept constant a 20% higher input voltage would be required (law U/f). However, if this 20% higher voltage is not supplied all voltage dependant parameters will be affected in accordance with the following scheme.

net voltage = rated motor voltage			
Power	P	kW	100 %
Rated rpm	n_n	U/min	120 %
Rated torque	M_n	Nm	83.3 %
Starting torque	M_A	Nm	64 %
Pull-up torque	M_S	Nm	64 %
Pull-out torque	M_K	Nm	64 %
Rated amperage	I_N	A	95 %
Starting amperage	I_A	A	80 %
Power factor	cos φ		106 %
Efficiency	η		99.5 %

Effect using 50 Hz rated motor in a 60 Hz net supply with 15/ 20% higher voltage

Motor rated: 230/400 V - 3 ph - 50 Hz
Net supply: 276/480 V - 3 ph - 60 Hz - 2 & 4 poles (motor voltage + 20%)
Net supply: 265/480 V - 3 ph - 60 Hz - 6, 8, 10 & 12 pole (motor voltage + 15%)

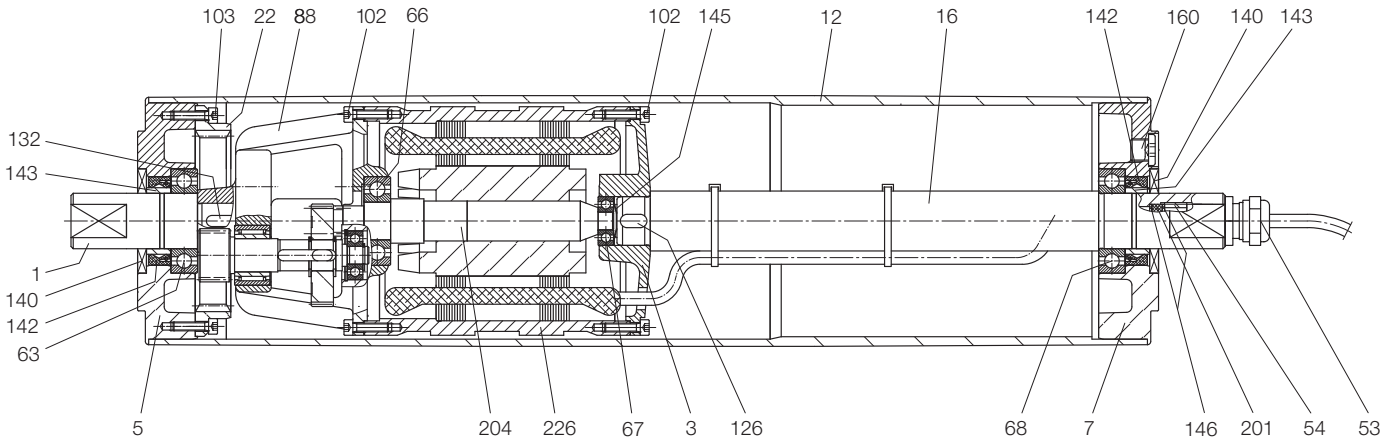
Using a 50 Hz motor in a 60 Hz net with 20% higher voltage will increase the frequency and therefore the speed by 20% but will maintain all the rated motor parameters subject to small variations (law U/f).

If the net supply voltage = motor voltage +15% the actual motor power will be 92% of the original motor power.

net voltage = 1.2 x rated motor voltage (for 2 and 4 poles)			
Power	P	kW	100 %
Rated rpm	n_n	U/min	120 %
Rated torque	M_n	Nm	100 %
Starting torque	M_A	Nm	100 %
Pull-up torque	M_S	Nm	100 %
Pull-out torque	M_K	Nm	100 %
Rated amperage	I_N	A	102 %
Starting amperage	I_A	A	100 %
Power factor	cos φ		100 %
Efficiency	η		98 %

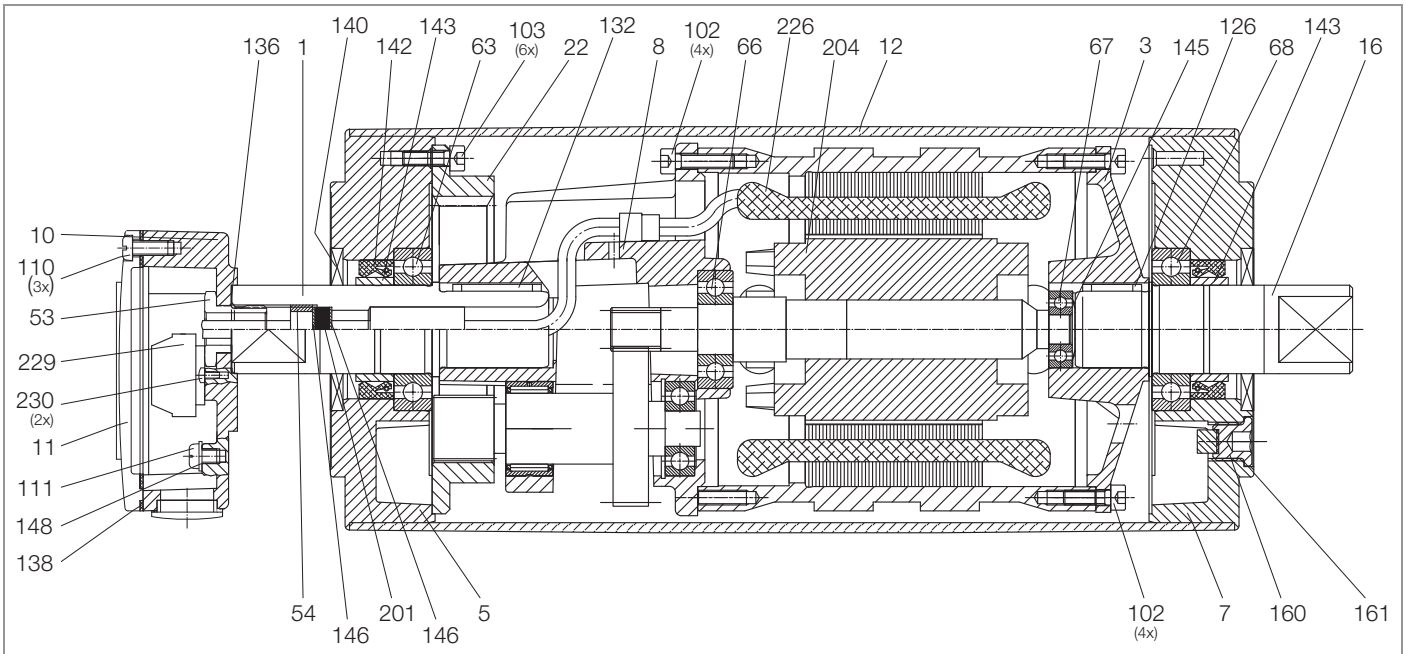
Product information i-series

Components of the i-series Drum Motor



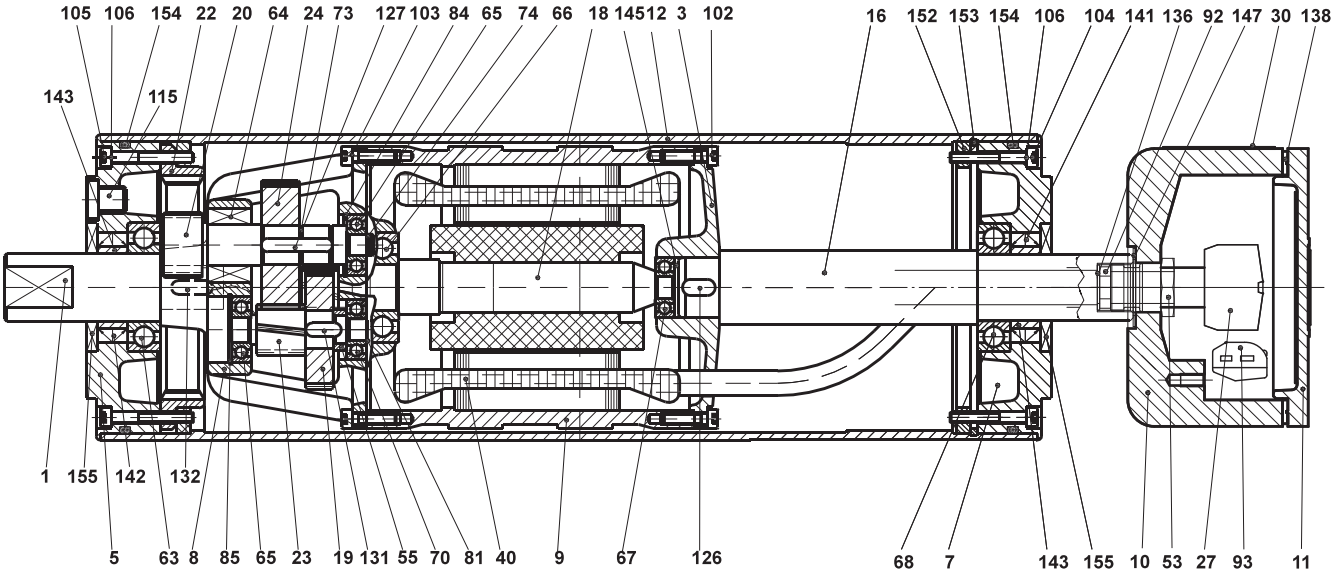
80i, 113i

1	Front shaft	63	Ball bearing	142	End house sealing
3	Rear flange	66	Ball bearing (rotor shaft gear side)	143	Ground sleeve
5	Housing front	67	Ball bearing (rotor shaft)	145	Distance washer (rotor shaft bearing)
7	Housing rear	68	Ball bearing	146	Washer (electrical connection)
8	Gear set	102	Screw (gearbox/stator/rear flange)	160	Oil plug
12	Shell	103	Screw (gearrim/bearing/ house)	161	O-ring (oil plug)
16	Rear shaft	126	Key (rear shaft)	201	Sealing (cable/shaft)
22	Geared rim	132	Key (front shaft)	204	Rotor complete
53	Connection nipple	140	Labyrinth seal	226	Stator complete
54	Pressure nipple				



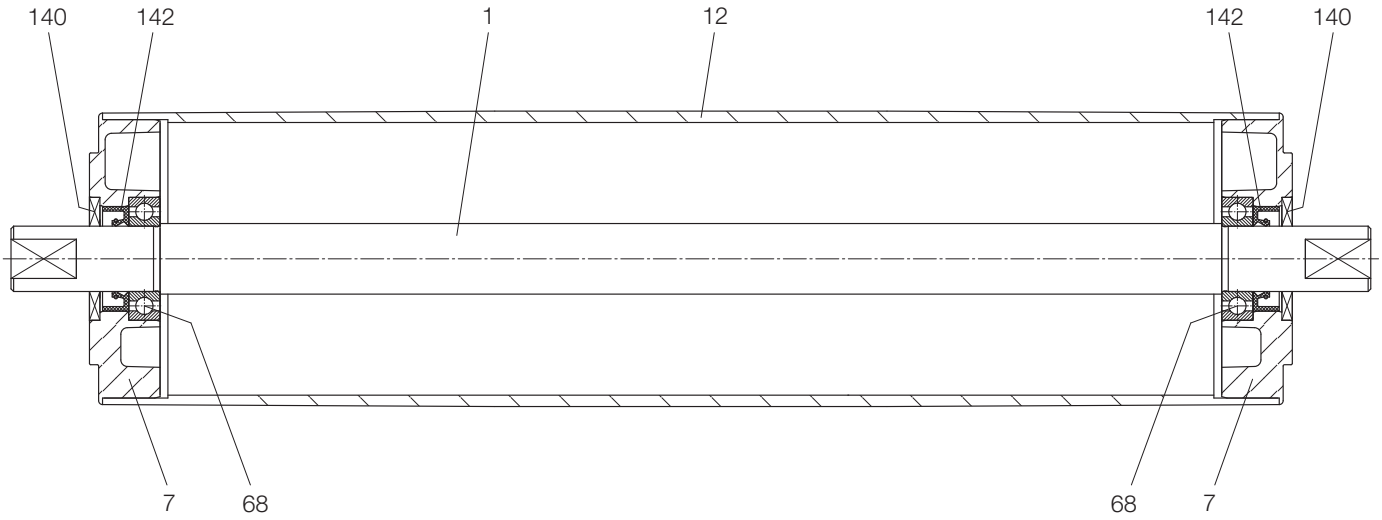
138i, 165i, 216i

1	Front shaft	66	Ball bearing (rotor shaft gear side)	142	Double lip seal
3	Rear flange	67	Ball bearing (rotor shaft)	143	Ground sleeve
5	Housing front	68	Ball bearing	145	Distance washer (rotor shaft bearing)
7	Housing rear	102	Screw (gearbox/stator/rear flange)	146	Washer (electrical connection)
8	Gear set	103	Screw (gearrim/bearing/ house)	148	Washer (earth screw terminal box)
10	Terminal box	110	Screw (terminal box/cover)	160	Oil plug
11	Terminal box cover	111	Screw (terminal box-earth)	161	O-ring (oil plug)
12	Shell	126	Key (rear shaft)	201	Sealing (cable/shaft)
16	Rear shaft	132	Key (front shaft)	204	Rotor complete
22	Geared rim	136	Seal (terminal box/front shaft)	226	Stator complete
53	Connection nipple	138	Rubber seal (terminal box)	229	WAGO Clamp
54	Pressure nipple	140	Labyrinth seal	230	Screw for WAGO Clamp
63	Ball bearing				



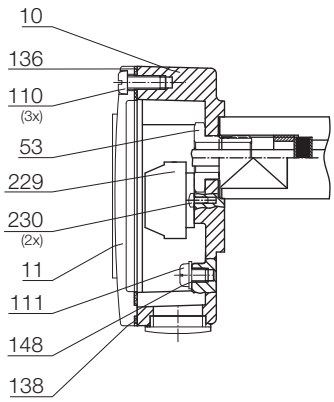
217i, 315i

1	Front shaft	63	Ball bearing	126	Key
3	Rear flange	64	Needle bearing	127	Key
5	Housing front	65	Ball bearing	131	Key
7	Housing rear	68	Ball bearing	132	Key
8	Gear box	70	Ball bearing	136	Retaining ring
10	Terminal box	73	Retaining ring	138	Gasket
11	Terminal box cover	74	Retaining ring	141	Sealing ring
12	Drum shell	81	Retaining ring	142	Sealing ring
16	Rear shaft	84	Retaining ring	143	Ground sleeve
22	Geared rim	85	Retaining ring	145	Washer
23	Interm. pinion	92	Gasket	147	Terminal box gasket
24	Interm. wheel	93	Connecting clamp protection earth	152	Fixing ring
27	Terminal strip	102	Socket screw	153	Retaining ring
30	Data plate	103	Socket screw	154	O-ring seal
40	Stator	105	Socket screw	155	Labyrinth seal
53	Collar nipple	106	Socket screw		
55	Spacer bush	115	Oil screw		

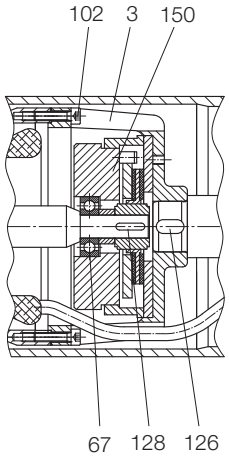


Idler pulley i-series

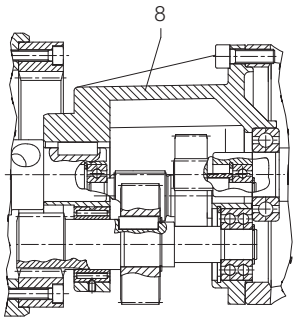
1	Shaft	12	Shell	140	Labyrinth seal
7	Housing	68	Ball bearing	142	Lip seal



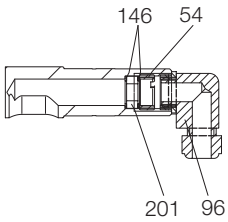
Terminal box



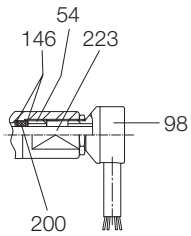
Electromagnetic brake



3-stage gearbox



Elbow cable connector



Stainless steel elbow cable connector

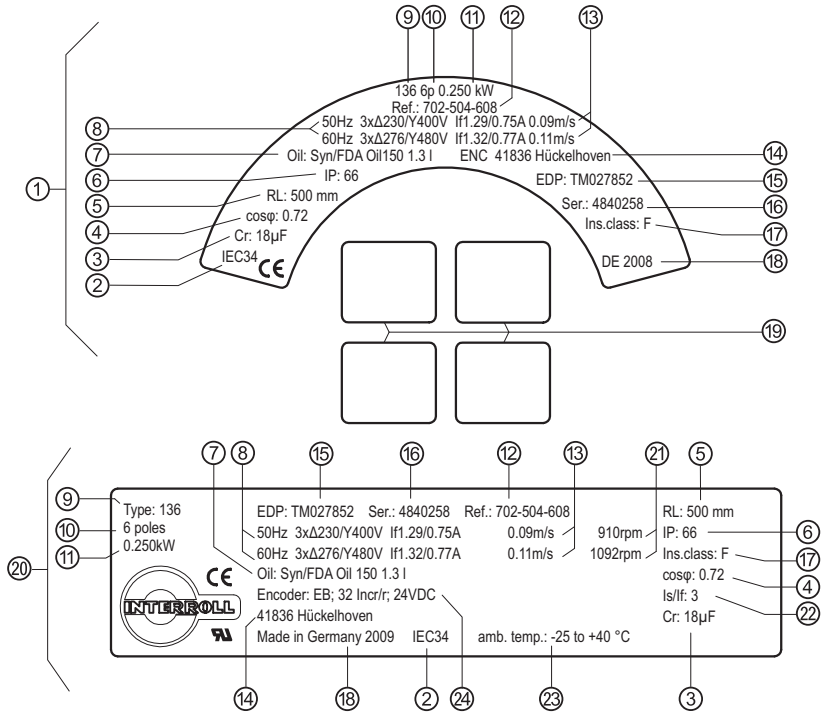
3	Rear flange	96	Elbow connection	148	Washer (earth screw terminal box)
8	Gearbox complete	98	Elbow connection (stainless steel)	150	Electromagnetic brake
10	Terminal box	110	Screw (terminal box/cover)	200	Sealing
11	Terminal box cover	111	Screw (terminal box-earth)	201	Sealing (cable/shaft)
21	Rubber seal	128	Key (Rotor Pinion)	223	Cable
53	Connection nipple	136	Seal (Terminal Box)	229	WAGO Clamp
54	Pressure nipple	138	Rubber seal (Terminal Box)	230	Screw for WAGO Clamp
67	Ball bearing (rotor shaft)	146	Washer (electrical connection)		

Label of the i-series Drum Motor

The specifications on the Drum Motor label are used to identify the Drum Motor. This is required to use the Drum Motor as intended.

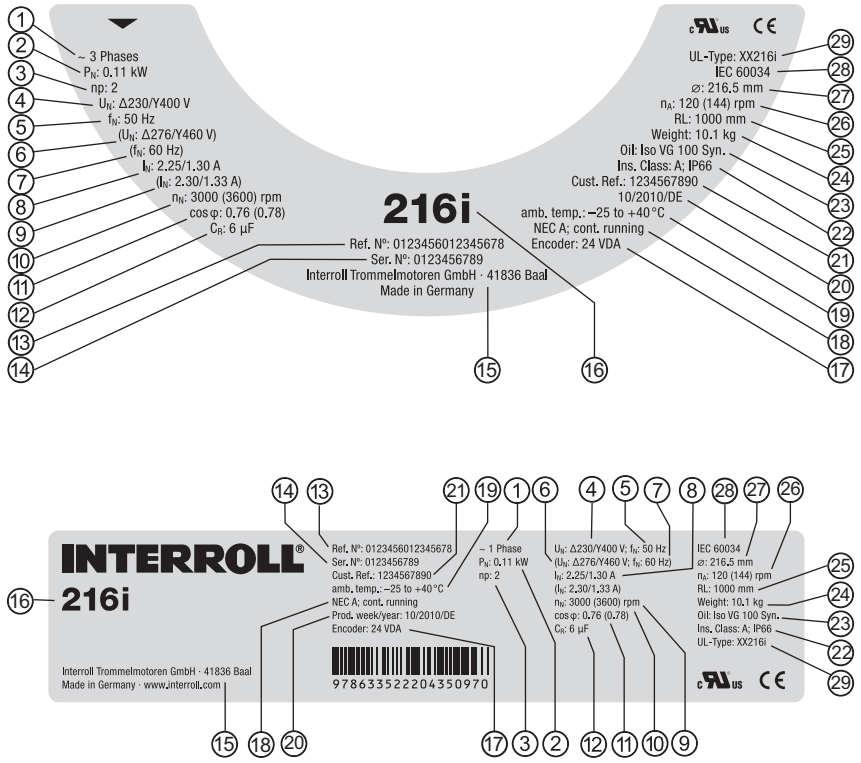
For i-series Drum Motors there are three types of labels:

- Semicircular label, placed on the drum end housing
- Rectangular label, placed on the Terminal Box (if available)
- Square labels with special information on features, placed on the components



Label for i- series up to August 2011

① Semicircular Drum Motor label
② International Electrical Commission: Standard for Drum Motor
③ Capacitor value
④ Power factor
⑤ Roller / shell length
⑥ Protection rating
⑦ Oil type
⑧ Frequency, number of phases, and rated voltage
⑨ Type of Drum Motor
⑩ Number of poles
⑪ Rated power
⑫ Customer reference number
⑬ Rated current and drum speed
⑭ Place of production
⑮ Article no.
⑯ Serial no.
⑰ Insulation class
⑱ Country and date of production
⑲ Labels for external components
⑳ Terminal Box label
㉑ Rated rotor speed
㉒ Ratio starting current / rated current
㉓ Ambient temperature range
㉔ Specifications of encoder or brake



Label for i- series from September 2011

① Number of phases
② Rated power
③ Number of poles
④ Rated voltage
⑤ Rated freqency
⑥ Rated voltage [1)]
⑦ Rated freqency [1)]
⑧ Rated current
⑨ Rated current [1)]
⑩ Rated speed of rotor [1)]
⑪ Power factor [1)]
⑫ Run capacitor
⑬ Reference number
⑭ Serial number
⑮ Place of production
⑯ Type
⑰ Specifications of encoder or brake
⑱ Type of NEC standard for continuous running
⑲ Ambient temperature range
⑳ Date and country of production
㉑ Customer reference number
㉒ Insulation class and protection rating
㉓ Oil type
㉔ Weight
㉕ Roller / shell length
㉖ Rated revolutions of the shell [1)]
㉗ Max. diameter of the shell
㉘ International Electrical Commission: Standard for Drum Motor
㉙ Type of UL standard

[1)] Value depends on the given voltage. All values in brackets refer to the rated voltage in brackets.

Electrical data for i-series

Explanation of abbreviations

P_N in kW	Rated power	M_S/M_N	Ratio of starting torque to rated torque
np	Number of poles	M_P/M_N	Ratio of pull-up torque to rated torque
n_N in rpm	Rated speed of rotor	M_B/M_N	Ratio of break-down torque to rated torque
f_N in Hz	Rated frequency	M_N	Rated torque of rotor
U_N in V	Rated voltage	R_M in Ω	Phase resistance
I_N in A	Rated current	$U_{SH\ delta}$ in V	Preheating voltage in delta connection
cos φ	Power factor	$U_{SH\ star}$ in V	Preheating voltage in star connection
η	Efficiency	$U_{SH\ \sim}$ in V	Preheating voltage in single phase
J_R in kgcm^2	Rotor moment of inertia	C_r in µF	Run capacitor
I_S/I_N	Ratio of starting current to rated current		

80i 3-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			kgcm^2					Nm	Ω	V DC	V DC	µF
0.018	8	610	50	230	0.33	0.63	0.22	0.9	1.2	1.00	1.20	1.00	0.28	575.0	60		5
				400	0.19	0.63	0.22	0.9	1.2	1.00	1.20	1.00	0.28	575.0		103	5
0.04	4	1348	50	230	0.37	0.68	0.40	0.4	1.9	1.80	2.00	1.80	0.28	240.0	30		5
				400	0.21	0.68	0.40	0.4	1.9	1.80	2.00	1.80	0.28	240.0		51	5
0.07	4	1288	50	230	0.48	0.68	0.53	0.6	1.4	1.66	1.75	1.66	0.52	156.0	25		7
				400	0.28	0.68	0.53	0.6	1.4	1.66	1.75	1.66	0.52	156.0		45	7
	2	2778	50	230	0.38	0.82	0.56	0.4	2.6	1.90	2.00	1.90	0.24	190.0	30		-
				400	0.22	0.82	0.56	0.4	2.6	1.90	2.00	1.90	0.24	190.0		51	-
0.12	2	2778	50	230	0.59	0.78	0.65	0.6	2.6	2.00	2.10	2.00	0.41	89.0	20		-
				400	0.34	0.78	0.65	0.6	2.6	2.00	2.10	2.00	0.41	89.0		35	-

80i 3-phase derated

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			kgcm^2					Nm	Ω	V DC	V DC	µF
0.033	4	1384	50	230	0.30	0.62	0.45	0.4	1.7	2.73	2.74	2.48	0.23	286.5	27		4
				400	0.17	0.62	0.45	0.4	1.7	2.73	2.74	2.48	0.23	286.5		45	4
0.06	4	1310	50	230	0.40	0.68	0.56	0.6	1.3	2.48	2.56	2.15	0.44	191.0	26		5
				400	0.23	0.68	0.56	0.6	1.3	2.48	2.56	2.15	0.44	191.0		45	5
	2	2750	50	230	0.26	0.78	0.75	0.4	2.4	2.15	2.26	1.90	0.21	183.5	19		-
				400	0.15	0.78	0.75	0.4	2.4	2.15	2.26	1.90	0.21	183.5		32	-
0.1	2	2727	50	230	0.45	0.78	0.71	0.6	2.4	2.31	2.13	2.15	0.35	106.4	19		-
				400	0.26	0.78	0.71	0.6	2.4	2.31	2.13	2.15	0.35	106.4		32	-

113i 3-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.035	12	353	50	230	0.71	0.60	0.21	3.3	2.4	1.10	1.46	1.10	0.95	208.0	44		10
				400	0.41	0.60	0.21	3.3	2.4	1.10	1.46	1.10	0.95	208.0		77	10
0.07	12	353	50	230	1.07	0.60	0.27	5.7	2.0	1.00	1.30	1.00	1.89	128.0	41		15
				400	0.62	0.60	0.27	5.7	2.0	1.00	1.30	1.00	1.89	128.0		71	15
0.08	8	680	50	230	0.69	0.60	0.48	3.3	2.2	1.40	1.60	1.40	1.12	164.0	34		10
				400	0.40	0.60	0.48	3.3	2.2	1.40	1.60	1.40	1.12	164.0		59	10
0.1	6	865	50	230	0.80	0.66	0.47	3.3	2.1	1.80	2.00	1.80	1.10	111.4	29		11
				400	0.46	0.66	0.47	3.3	2.1	1.80	2.00	1.80	1.10	111.4		51	11
0.15	8	678	50	230	1.18	0.62	0.51	5.7	2.2	1.35	1.50	1.35	2.11	89.0	33		16
				400	0.68	0.62	0.51	5.7	2.2	1.35	1.50	1.35	2.11	89.0		56	16
	4	1360	50	230	0.94	0.71	0.56	2.1	3.2	1.85	2.15	1.85	1.05	71.0	24		13
				400	0.54	0.71	0.56	2.1	3.2	1.85	2.15	1.85	1.05	71.0		41	13
0.18	6	915	50	230	1.39	0.62	0.52	5.7	2.4	2.80	3.00	2.80	1.88	42.8	18		19
				400	0.80	0.62	0.52	5.7	2.4	2.80	3.00	2.80	1.88	42.8		32	19
0.225	4	1308	50	230	1.56	0.71	0.51	2.1	2.7	2.00	2.30	2.00	1.64	40.6	22		21
				400	0.90	0.71	0.51	2.1	2.7	2.00	2.30	2.00	1.64	40.6		39	21
	2	2821	50	230	1.21	0.71	0.65	1.4	4.6	3.50	3.70	3.50	0.76	29.6	13		-
				400	0.70	0.71	0.65	1.4	4.6	3.50	3.70	3.50	0.76	29.6		22	-
0.3	4	1376	50	230	1.58	0.79	0.60	3.8	3.2	1.70	1.90	1.70	2.08	41.0	26		22
				400	0.91	0.79	0.60	3.8	3.2	1.70	1.90	1.70	2.08	41.0		44	22
0.37	4	1301	50	230	1.91	0.79	0.62	3.8	3.2	2.40	2.30	2.20	2.72	26.4	20		26
				400	1.10	0.79	0.62	3.8	3.2	2.40	2.30	2.20	2.72	26.4		34	26
	2	2835	50	230	1.91	0.79	0.62	2.4	6.1	3.65	3.90	3.65	1.25	16.5	12		-
				400	1.10	0.79	0.62	2.4	6.1	3.65	3.90	3.65	1.25	16.5		22	-

113i 3-phase derated

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.06	12	353	50	230	0.88	0.60	0.28	5.7	1.9	1.07	1.16	0.91	1.62	144.0	38		12
				400	0.51	0.60	0.28	5.7	1.9	1.07	1.16	0.91	1.62	144.0		66	12
0.07	8	680	50	230	0.55	0.60	0.53	3.3	2.0	1.57	1.82	1.74	0.98	200.0	33		8
				400	0.32	0.60	0.53	3.3	2.0	1.57	1.82	1.74	0.98	200.0		58	8
0.08	6	865	50	230	0.66	0.63	0.48	3.3	1.9	1.80	1.74	1.49	0.88	126.4	26		9
				400	0.38	0.63	0.48	3.3	1.9	1.80	1.74	1.49	0.88	126.4		45	9
0.12	8	678	50	230	0.97	0.62	0.50	5.7	2.0	2.32	2.18	2.05	1.69	97.0	29		13
				400	0.56	0.62	0.50	5.7	2.0	2.32	2.18	2.05	1.69	97.0		51	13
	4	1360	50	230	0.61	0.70	0.71	2.1	2.9	1.57	1.57	1.32	0.84	86.0	18		8
				400	0.35	0.70	0.71	2.1	2.9	1.57	1.57	1.32	0.84	86.0		32	8
0.15	6	915	50	230	1.02	0.62	0.59	5.7	2.2	2.81	2.64	2.48	1.57	54.8	17		14
				400	0.59	0.62	0.59	5.7	2.2	2.81	2.64	2.48	1.57	54.8		30	14
0.21	2	2850	50	230	1.11	0.71	0.66	1.4	4.2	2.48	2.56	2.31	0.70	36.1	14		-
				400	0.64	0.71	0.66	1.4	4.2	2.48	2.56	2.31	0.70	36.1		25	-
0.25	4	1329	50	230	1.02	0.79	0.78	3.8	2.9	2.23	2.23	2.07	1.80	49.8	20		14
				400	0.59	0.79	0.78	3.8	2.9	2.23	2.23	2.07	1.80	49.8		35	14
0.31	4	1376	50	230	1.44	0.78	0.69	3.8	2.9	2.23	2.23	2.07	2.15	41.5	23		20
				400	0.83	0.78	0.69	3.8	2.9	2.23	2.23	2.07	2.15	41.5		40	20
	2	2880	50	230	1.42	0.79	0.69	2.4	4.2	2.48	2.56	2.31	1.03	20.5	11		-
				400	0.82	0.79	0.69	2.4	4.2	2.48	2.56	2.31	1.03	20.5		20	-

138i 3-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.09	12	415	50	230	1.04	0.40	0.54	9.3	3.0	1.15	1.68	1.15	2.07	92.0	19		14
				400	0.60	0.40	0.54	9.3	3.0	1.15	1.68	1.15	2.07	92.0		33	14
0.18	8	684	50	230	1.21	0.64	0.58	9.3	2.6	1.10	1.55	1.10	2.51	64.0	25		17
				400	0.70	0.64	0.58	9.3	2.6	1.10	1.55	1.10	2.51	64.0		43	17
0.25	6	910	50	230	1.30	0.72	0.67	9.3	3.0	1.35	1.75	1.35	2.62	44.0	21		18
				400	0.75	0.72	0.67	9.3	3.0	1.35	1.75	1.35	2.62	44.0		36	18
0.37	4	1340	50	230	1.68	0.79	0.70	5.6	3.3	1.55	1.95	1.55	2.64	26.5	18		23
				400	0.97	0.79	0.70	5.6	3.3	1.55	1.95	1.55	2.64	26.5		30	23
0.55	2	2826	50	230	2.25	0.80	0.76	3.5	5.5	3.20	3.65	3.20	1.86	11.4	10		-
				400	1.30	0.80	0.76	3.5	5.5	3.20	3.65	3.20	1.86	11.4		18	-
0.75	4	1381	50	230	3.29	0.80	0.71	9.9	3.4	2.10	2.45	2.10	5.19	9.7	13		45
				400	1.90	0.80	0.71	9.9	3.4	2.10	2.45	2.10	5.19	9.7		22	45
1.0	2	2775	50	230	4.16	0.80	0.75	6.2	5.4	3.40	3.95	3.40	3.44	5.4	9		-
				400	2.40	0.80	0.75	6.2	5.4	3.40	3.95	3.40	3.44	5.4		16	-

138i 3-phase derated

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.07	12	415	50	230	0.95	0.40	0.46	9.3	2.7	1.16	1.32	0.99	1.61	110.0	21		13
				400	0.55	0.40	0.46	9.3	2.7	1.16	1.32	0.99	1.61	110.0		36	13
0.15	8	684	50	230	0.95	0.64	0.61	9.3	2.4	1.32	1.40	1.16	2.09	98.0	30		13
				400	0.55	0.64	0.61	9.3	2.4	1.32	1.40	1.16	2.09	98.0		52	13
0.21	6	920	50	230	1.11	0.68	0.70	9.3	2.7	1.40	1.40	1.24	2.18	47.8	18		15
				400	0.64	0.68	0.70	9.3	2.7	1.40	1.40	1.24	2.18	47.8		31	15
0.31	4	1350	50	230	1.26	0.79	0.78	5.6	3.0	1.34	1.49	1.16	2.19	33.1	16		17
				400	0.73	0.79	0.78	5.6	3.0	1.34	1.49	1.16	2.19	33.1		29	17
0.45	2	2826	50	230	2.13	0.72	0.73	3.5	5.0	2.38	2.56	1.98	1.52	14.1	11		-
				400	1.23	0.72	0.73	3.5	5.0	2.38	2.56	1.98	1.52	14.1		19	-
0.62	4	1395	50	230	2.68	0.79	0.73	9.9	3.1	1.07	1.24	1.07	4.24	11.8	12		37
				400	1.55	0.79	0.73	9.9	3.1	1.07	1.24	1.07	4.24	11.8		22	37
0.83	2	2762	50	230	3.15	0.81	0.81	6.2	4.9	1.90	2.07	1.74	2.87	6.8	9		-
				400	1.82	0.81	0.81	6.2	4.9	1.90	2.07	1.74	2.87	6.8		15	-

165i 3-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.15	12	456	50	230	1.13	0.60	0.56	22.6	5.4	1.00	1.30	1.00	3.14	75.5	26		16
				400	0.65	0.60	0.56	22.6	5.4	1.00	1.30	1.00	3.14	75.5		44	16
0.37	12	456	50	230	2.77	0.63	0.53	35.1	2.0	1.20	1.50	1.20	7.75	19.4	17		38
				400	1.60	0.63	0.53	35.1	2.0	1.20	1.50	1.20	7.75	19.4		29	38
	8	690	50	230	2.42	0.62	0.57	22.6	2.9	1.90	2.35	1.90	5.12	22.0	17		36
				400	1.50	0.62	0.57	22.6	2.9	1.90	2.35	1.90	5.12	22.0		31	36
	4	1382	50	230	2.17	0.64	0.67	11.3	4.4	2.00	2.50	1.80	2.56	14.5	10		30
				400	1.25	0.64	0.67	11.3	4.4	2.00	2.50	1.80	2.56	14.5		17	30
0.55	6	845	50	230	2.77	0.69	0.72	22.6	3.4	1.40	1.65	1.40	6.22	19.5	19		38
				400	1.60	0.69	0.72	22.6	3.4	1.40	1.65	1.40	6.22	19.5		32	38
0.75	8	691	50	230	3.55	0.74	0.71	35.1	7.6	1.30	1.60	1.30	10.37	15.7	21		49
				400	2.05	0.74	0.71	35.1	7.6	1.30	1.60	1.30	10.37	15.7		36	49
	6	845	50	230	3.64	0.81	0.64	22.6	3.5	1.75	2.00	1.75	8.48	6.2	9		50
				400	2.10	0.81	0.64	22.6	3.5	1.75	2.00	1.75	8.48	6.2		16	50
	4	1355	50	230	3.12	0.80	0.75	11.3	3.5	1.53	1.80	1.30	5.29	23.9	30		43
				400	1.80	0.80	0.75	11.3	3.5	1.53	1.80	1.30	5.29	23.9		52	43
1.1	4	1320	50	230	4.85	0.82	0.69	11.3	3.5	1.50	1.70	1.30	7.96	7.2	14		67
				400	2.80	0.82	0.69	11.3	3.5	1.50	1.70	1.30	7.96	7.2		25	67
	2	2845	50	230	4.16	0.86	0.77	7.6	5.2	3.15	3.42	2.10	3.69	2.9	5		-
				400	2.40	0.86	0.77	7.6	5.2	3.15	3.42	2.10	3.69	2.9		9	-
1.5	4	1393	50	230	6.06	0.87	0.71	19.8	3.8	1.55	2.10	1.55	10.28	5.2	14		84
				400	3.50	0.87	0.71	19.8	3.8	1.55	2.10	1.55	10.28	5.2		24	84
2.2	2	2840	50	230	7.88	0.86	0.81	7.6	5.3	2.60	3.20	2.60	7.40	6.2	21		-
				400	4.55	0.86	0.81	7.6	5.3	2.60	3.20	2.60	7.40	6.2		36	-

165i 3-phase derated

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.31	12	456	50	230	2.51	0.62	0.50	35.1	1.8	1.74	1.98	1.57	6.49	22.4	17		35
				400	1.45	0.62	0.50	35.1	1.8	1.74	1.98	1.57	6.49	22.4		30	35
	8	640	50	230	1.99	0.62	0.63	22.6	2.9	1.24	1.40	1.16	4.63	28.0	17		27
				400	1.15	0.62	0.63	22.6	2.9	1.24	1.40	1.16	4.63	28.0		30	27
0.45	6	845	50	230	2.04	0.75	0.74	22.6	3.1	1.07	1.07	1.07	5.09	25.0	19		28
				400	1.18	0.75	0.74	22.6	3.1	1.07	1.07	1.07	5.09	25.0		33	28
0.62	6	865	50	230	3.31	0.78	0.60	22.6	3.2	1.17	1.20	1.16	6.85	6.2	8		46
				400	1.91	0.78	0.60	22.6	3.2	1.17	1.20	1.16	6.85	6.2		14	46
	4	1378	50	230	2.56	0.80	0.76	11.3	3.6	1.30	1.50	1.10	4.30	14.4	15		35
				400	1.48	0.80	0.76	11.3	3.6	1.30	1.50	1.10	4.30	14.4		26	35
0.9	4	1320	50	230	3.93	0.84	0.68	11.3	3.7	1.16	1.24	1.07	6.51	8.3	14		54
				400	2.27	0.84	0.68	11.3	3.7	1.16	1.24	1.07	6.51	8.3		24	54
	2	2860	50	230	3.31	0.86	0.79	7.3	4.6	2.48	2.64	1.74	3.01	6.2	9		-
				400	1.91	0.86	0.79	7.3	4.6	2.48	2.64	1.74	3.01	6.2		15	-
1.24	4	1393	50	230	4.95	0.80	0.78	19.8	3.5	1.18	1.21	1.07	8.50	6.2	12		68
				400	2.86	0.80	0.78	19.8	3.5	1.18	1.21	1.07	8.50	6.2		21	68
1.82	2	2850	50	230	6.46	0.85	0.83	7.6	4.8	2.07	2.31	1.65	6.10	6.2	17		-
				400	3.73	0.85	0.83	7.6	4.8	2.07	2.31	1.65	6.10	6.2		29	-

216i 3-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.15	12	456	50	230	1.13	0.60	0.56	22.6	5.4	1.00	1.30	1.00	3.14	75.5	26		16
				400	0.65	0.60	0.56	22.6	5.4	1.00	1.30	1.00	3.14	75.5		44	16
0.37	12	456	50	230	2.77	0.63	0.53	35.1	2.0	1.20	1.50	1.20	7.75	19.4	17		38
				400	1.60	0.63	0.53	35.1	2.0	1.20	1.50	1.20	7.75	19.4		29	38
	8	690	50	230	2.42	0.62	0.57	22.6	2.9	1.90	2.35	1.90	5.12	22.0	17		36
				400	1.50	0.62	0.57	22.6	2.9	1.90	2.35	1.90	5.12	22.0		31	36
	4	1382	50	230	2.17	0.64	0.67	11.3	4.4	2.00	2.50	1.80	2.56	14.5	10		30
				400	1.25	0.64	0.67	11.3	4.4	2.00	2.50	1.80	2.56	14.5		17	30
0.55	6	845	50	230	2.77	0.69	0.72	22.6	3.4	1.40	1.65	1.40	6.22	19.5	19		38
				400	1.60	0.69	0.72	22.6	3.4	1.40	1.65	1.40	6.22	19.5		32	38
0.75	8	691	50	230	3.55	0.74	0.71	35.1	7.6	1.30	1.60	1.30	10.37	15.7	21		49
				400	2.05	0.74	0.71	35.1	7.6	1.30	1.60	1.30	10.37	15.7		36	49
	6	845	50	230	3.64	0.81	0.64	22.6	3.5	1.75	2.00	1.75	8.48	6.2	9		50
				400	2.10	0.81	0.64	22.6	3.5	1.75	2.00	1.75	8.48	6.2		16	50
	4	1355	50	230	3.12	0.80	0.75	11.3	3.5	1.53	1.80	1.30	5.29	23.9	30		43
				400	1.80	0.80	0.75	11.3	3.5	1.53	1.80	1.30	5.29	23.9		52	43
1.1	4	1320	50	230	4.85	0.82	0.69	11.3	3.5	1.50	1.70	1.30	7.96	7.2	14		67
				400	2.80	0.82	0.69	11.3	3.5	1.50	1.70	1.30	7.96	7.2		25	67
	2	2845	50	230	4.16	0.86	0.77	7.6	5.2	3.15	3.42	2.10	3.69	2.9	5		-
				400	2.40	0.86	0.77	7.6	5.2	3.15	3.42	2.10	3.69	2.9		9	-
1.5	4	1393	50	230	6.06	0.87	0.71	19.8	3.8	1.55	2.10	1.55	10.28	5.2	14		84
				400	3.50	0.87	0.71	19.8	3.8	1.55	2.10	1.55	10.28	5.2		24	84
2.2	2	2840	50	230	7.88	0.86	0.81	7.6	5.3	2.60	3.20	2.60	7.40	6.2	21		-
				400	4.55	0.86	0.81	7.6	5.3	2.60	3.20	2.60	7.40	6.2		36	-

216i 3-phase derated

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.31	12	456	50	230	2.51	0.62	0.50	35.1	1.8	1.74	1.98	1.57	6.49	22.4	17		35
				400	1.45	0.62	0.50	35.1	1.8	1.74	1.98	1.57	6.49	22.4		30	35
	8	640	50	230	1.99	0.62	0.63	22.6	2.9	1.24	1.40	1.16	4.63	28.0	17		27
				400	1.15	0.62	0.63	22.6	2.9	1.24	1.40	1.16	4.63	28.0		30	27
0.45	6	845	50	230	2.04	0.75	0.74	22.6	3.1	1.07	1.07	1.07	5.09	25.0	19		28
				400	1.18	0.75	0.74	22.6	3.1	1.07	1.07	1.07	5.09	25.0		33	28
0.62	6	865	50	230	3.31	0.78	0.60	22.6	3.2	1.17	1.20	1.16	6.85	6.2	8		46
				400	1.91	0.78	0.60	22.6	3.2	1.17	1.20	1.16	6.85	6.2		14	46
	4	1378	50	230	2.56	0.80	0.76	11.3	3.6	1.30	1.50	1.10	4.30	14.4	15		35
				400	1.48	0.80	0.76	11.3	3.6	1.30	1.50	1.10	4.30	14.4		26	35
0.9	4	1320	50	230	3.93	0.84	0.68	11.3	3.7	1.16	1.24	1.07	6.51	8.3	14		54
				400	2.27	0.84	0.68	11.3	3.7	1.16	1.24	1.07	6.51	8.3		24	54
	2	2860	50	230	3.31	0.86	0.79	7.3	4.6	2.48	2.64	1.74	3.01	6.2	9		-
				400	1.91	0.86	0.79	7.3	4.6	2.48	2.64	1.74	3.01	6.2		15	-
1.24	4	1393	50	230	4.95	0.80	0.78	19.8	3.5	1.18	1.21	1.07	8.50	6.2	12		68
				400	2.86	0.80	0.78	19.8	3.5	1.18	1.21	1.07	8.50	6.2		21	68
1.82	2	2850	50	230	6.46	0.85	0.83	7.6	4.8	2.07	2.31	1.65	6.10	6.2	17		-
				400	3.73	0.85	0.83	7.6	4.8	2.07	2.31	1.65	6.10	6.2		29	-

217i 3-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
1.1	8	695	50	230	5.54	0.81	0.61	86.0	4.5	1.80	2.20	1.70	15.12	6.3	14		76
				400	3.20	0.81	0.61	86.0	4.5	1.80	2.20	1.70	15.12	6.3		24	76
1.5	6	960	50	230	6.93	0.82	0.66	86.0	4.8	2.10	2.50	1.90	14.92	4.3	12		95
				400	4.00	0.82	0.66	86.0	4.8	2.10	2.50	1.90	14.92	4.3		21	95
	4	1410	50	230	6.41	0.87	0.67	49.6	5.5	2.20	2.50	1.80	10.16	3.6	10		88
				400	3.70	0.87	0.67	49.6	5.5	2.20	2.50	1.80	10.16	3.6		17	88
	2	2781	50	230	6.41	0.85	0.69	26.0	6.4	2.70	3.20	2.40	5.15	4.5	12		-
				400	3.70	0.85	0.69	26.0	6.4	2.70	3.20	2.40	5.15	4.5		21	-
2.2	6	934	50	230	9.87	0.80	0.70	86.0	5.0	2.10	2.50	1.90	22.49	3.6	14		136
				400	5.70	0.80	0.70	86.0	5.0	2.10	2.50	1.90	22.49	3.6		25	136
	4	1420	50	230	9.01	0.87	0.70	60.0	5.9	2.40	2.90	2.30	14.80	3.5	14		124
				400	5.20	0.87	0.70	60.0	5.9	2.40	2.90	2.30	14.80	3.5		24	124
	2	2794	50	230	8.83	0.88	0.71	26.0	6.4	2.60	3.02	2.30	7.52	3.0	11		-
				400	5.10	0.88	0.71	26.0	6.4	2.60	3.02	2.30	7.52	3.0		20	-
3.0	4	1420	50	230	12.12	0.82	0.76	46.9	5.0	2.40	2.90	2.30	20.18	1.9	9		167
				400	7.00	0.82	0.76	46.9	5.0	2.40	2.90	2.30	20.18	1.9		16	167
	2	2812	50	230	11.52	0.82	0.80	38.1	6.5	2.60	3.40	2.40	10.19	1.6	7		-
				400	6.65	0.82	0.80	38.1	6.5	2.60	3.40	2.40	10.19	1.6		13	-

315i 3-phase

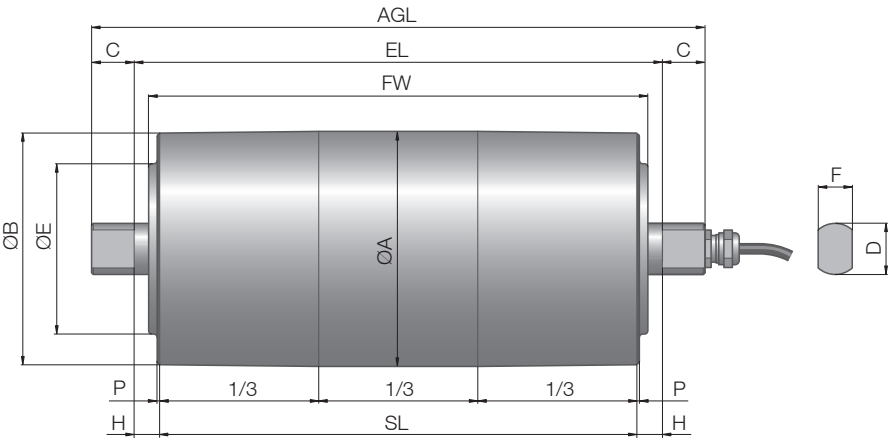
P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
1.5	8	690	50	230	8.31	0.75	0.60	380.0	2.2	2.20	3.00	2.00	20.76	2.2	7		115
				400	4.80	0.75	0.60	380.0	2.2	2.20	3.00	2.00	20.76	2.2		12	115
2.2	6	970	50	400	5.20	0.82	0.75	380.0	6.0	2.60	3.20	2.40	21.66	6.0	13		42
				690	3.00	0.82	0.75	380.0	6.0	2.60	3.20	2.40	21.66	6.0		22	42
4.0	4	1440	50	400	8.66	0.88	0.76	233.0	6.4	2.50	2.80	2.40	26.53	3.4	13		69
				690	5.00	0.88	0.76	233.0	6.4	2.50	2.80	2.40	26.53	3.4		22	69
5.5	2	2851	50	400	11.92	0.84	0.80	120.0	6.3	2.30	3.50	2.10	18.42	2.4	12		-
				690	6.88	0.84	0.80	120.0	6.3	2.30	3.50	2.10	18.42	2.4		21	-

Dimensions of the i-series Drum Motor

Some of the dimensions are indicated as "SL+". SL is an abbreviation for shell length and for i-series Drum Motors it is equal to the previously used RL, which is indicated on the Drum Motor label (*see "Label of the i-series Drum Motor", page 18*).

All length dependant dimensions shown in the catalogue and this user manual are in accordance with DIN/ISO 2768 (medium quality).

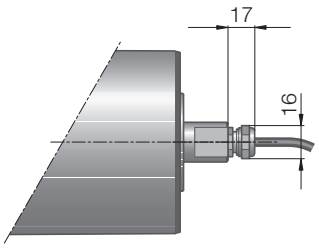
The recommended distance between the fixing brackets (EL) to allow for maximum thermal expansion and internal tolerances is EL + 2 mm.



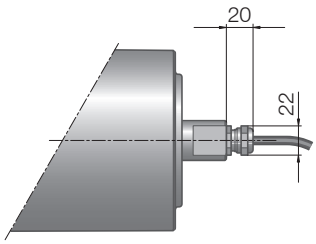
Dimensions of i-series Drum Motor

Type	A mm	B mm	C mm	D mm	E mm	F mm	H mm	L mm	N mm	P mm	FW mm	EL mm	AGL mm
80i crowned shell	81.5	80.5	12.5	17	43	13.5	6	17	16	2	SL+7	SL+12	SL+37
80i cylindrical shell	81	81	12.5	17	43	13.5	6	17	16	2	SL+7	SL+12	SL+37
80i cylindrical shell + key	81.7	81.7	12.5	17	43	13.5	6	17	16	2	SL+7	SL+12	SL+37
113i crowned shell	113.5	112	25	25	83	20	10	20	22	1.5	SL+10.6	SL+20	SL+70
113i cylindrical shell	113	113	25	25	83	20	10	20	22	1.5	SL+10.6	SL+20	SL+70
138i crowned shell	138	136	25	30	100	20	15	20	22	1.5	SL+13	SL+30	SL+80
138i cylindrical shell	136	136	25	30	100	20	15	20	22	1.5	SL+13	SL+30	SL+80
138i cylindrical shell + key	137	137	25	30	100	20	15	20	22	1.5	SL+13	SL+30	SL+80
165i crowned shell	164	162	45	40	130	30	20	20	22	1.5	SL+17	SL+40	SL+130
165i cylindrical shell	162	162	45	40	130	30	20	20	22	1.5	SL+17	SL+40	SL+130
165i cylindrical shell + key	162	162	45	40	130	30	20	20	22	1.5	SL+17	SL+40	SL+130
216i crowned shell	217.5	215.5	45	40	120	30	20	20	22	1.5	SL+17	SL+40	SL+130
216i cylindrical shell	215.5	215.5	45	40	120	30	20	20	22	1.5	SL+17	SL+40	SL+130
217i crowned shell	217.5	215.5	45	40	120	30	20			1.5	SL+17	SL+40	SL+130
217i cylindrical shell	215.5	215.5	45	40	120	30	20			1.5	SL+17	SL+40	SL+130
315i crowned shell	320	317	45	60	120	45	20				SL+30	SL+40	SL+130
315i cylindrical shell	317	317	45	60	120	45	20				SL+30	SL+40	SL+130

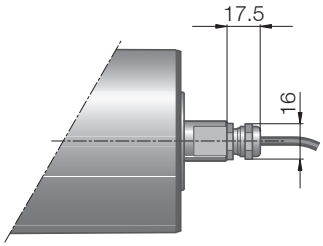
Cable connector dimensions



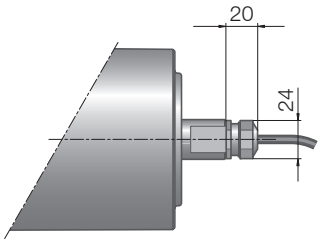
Straight brass/nickel cable connector for 80i



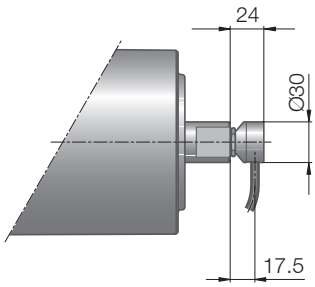
Straight brass/nickel cable connector for 113i, 138i, 165i, 216i, 217i, 315i



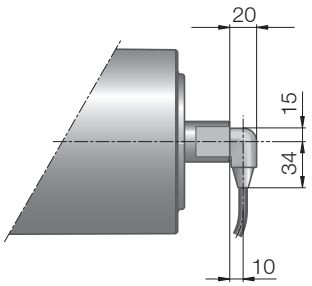
Straight stainless steel cable connector for 80i



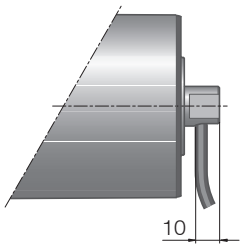
Straight stainless steel cable connector for 113i, 138i, 165i, 216i, 217i, 315i



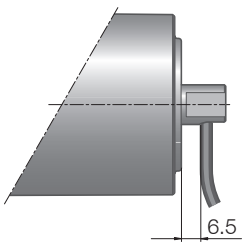
Elbow stainless steel cable connector



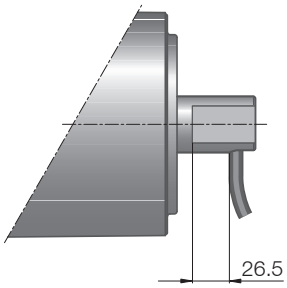
Elbow techno-polymer cable connector



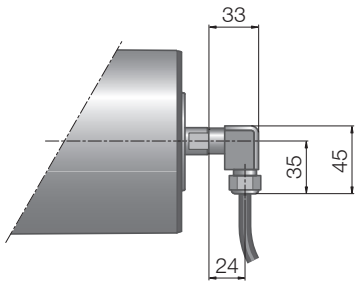
Special cable slot connector for 80i



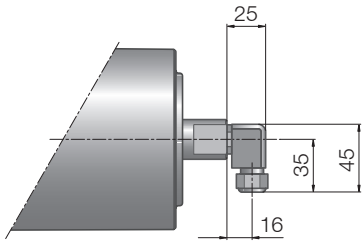
Special cable slot connector for 113i, 138i



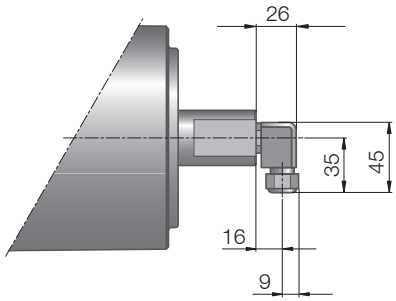
Special cable slot connector for 165i, 216i, 217i



Optional elbow techno-polymer cable connector for 80i

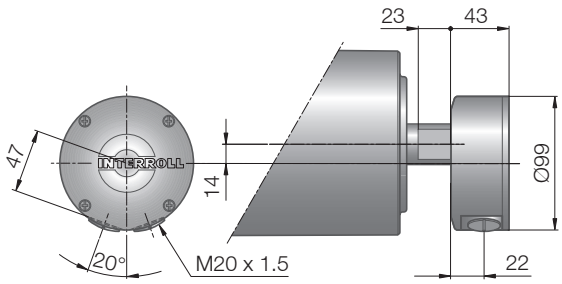


Optional elbow techno-polymer cable connector for 113i, 138i

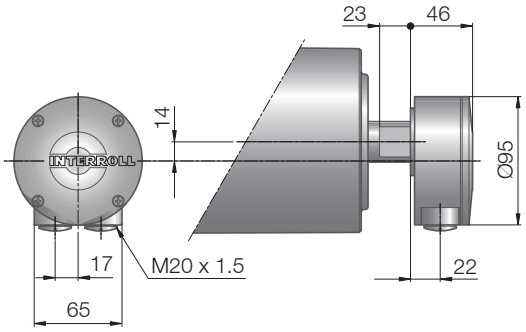


Optional elbow techno-polymer cable connector for 165i, 216i, 217i

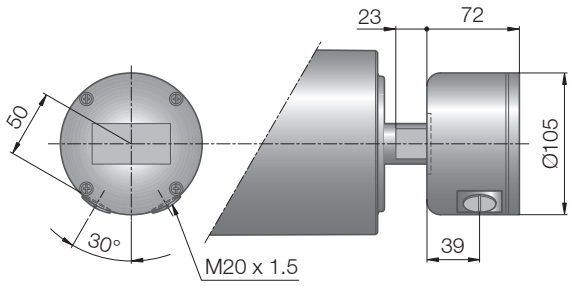
Terminal box dimensions



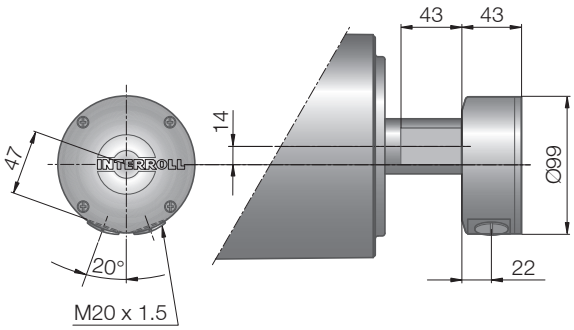
Stainless steel terminal box for 113i, 138i



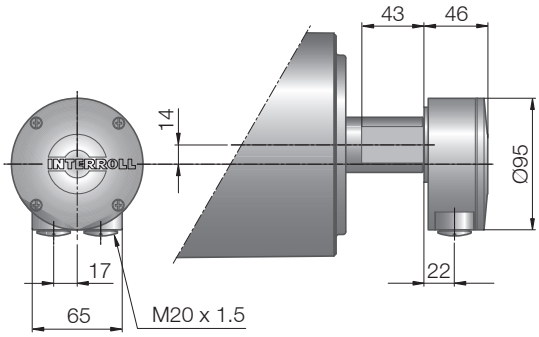
Aluminium terminal box for 113i, 138i



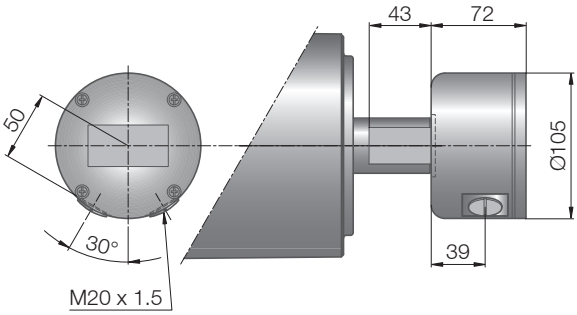
Techno-polymer terminal box for 113i, 138i



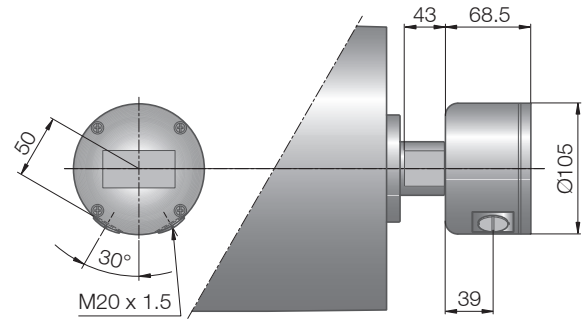
Stainless steel terminal box for 165i, 216i, 217i



Aluminium terminal box for 165i, 216i, 217i

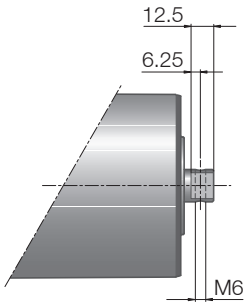


Techno-polymer terminal box for 165i, 216i, 217i

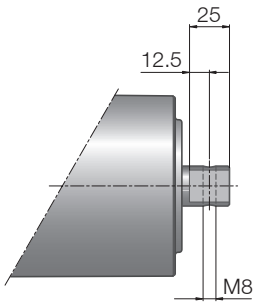


Techno-polymer terminal box for 315i

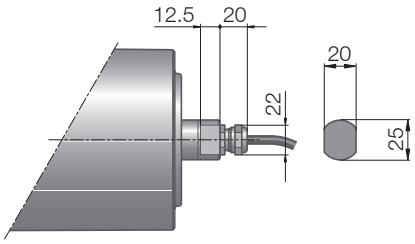
Shaft dimensions



Shaft, cross-drilled and threaded, for 80i



Shaft, cross-drilled and threaded, for 113i, 138i, 165i, 216i, 217i, 315i



Shaft for encoder for 80i (special connector requiered)

Connections Diagrams i-series

Only standard connection diagrams are shown in this manual. For other connections the connection diagram will be supplied seperately together with the Drum Motor.

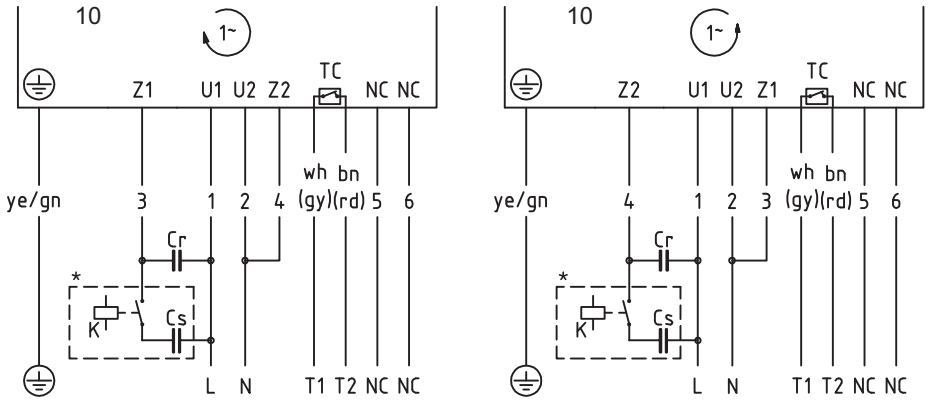
Explanation of abbreviations:

TC: Thermal control	1~: 1-phase motor	Cr: Capacitor run
BR: Brake option	3~: 3-phase motor	Cs: Capacitor start
NC: not connected		

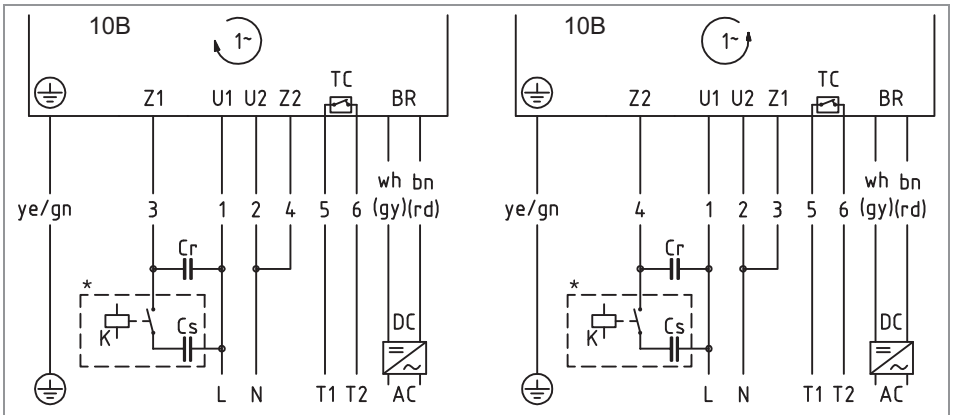
Color codes:

rd: red	gy: grey	wh: white
ye: yellow	gn: green	or: orange
bu: blue	bn: brown	vi: violet
bk: black	pk: pink	( ): alternative color

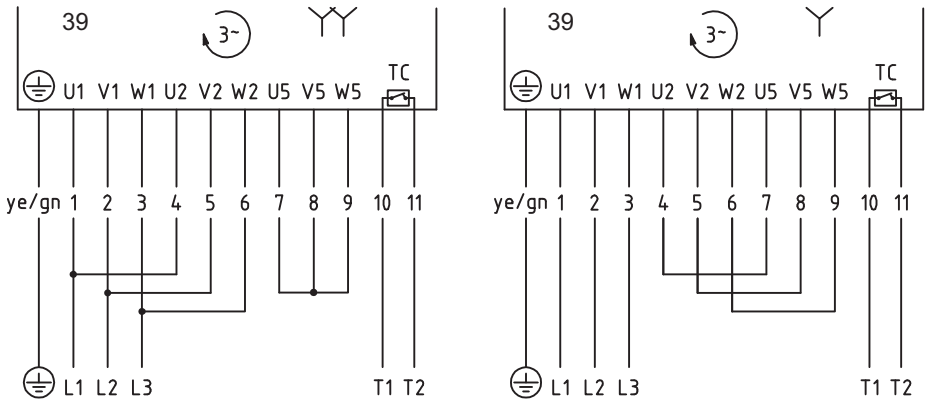
Cable connections



1-phase operation 7+2 lead cable

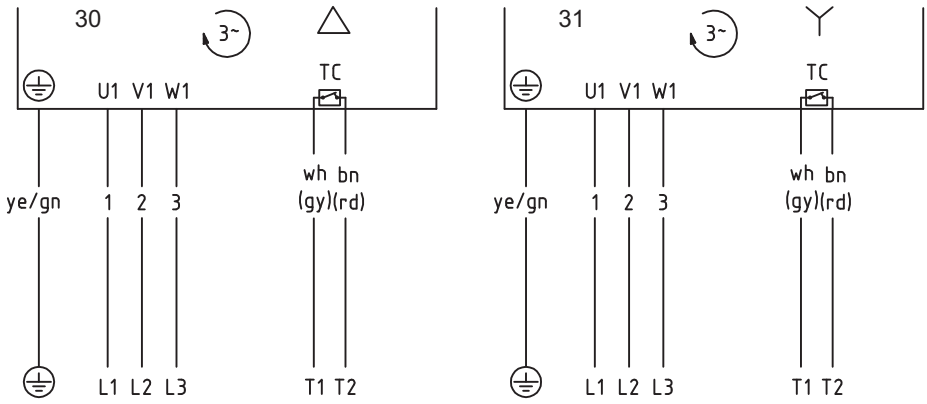


1-phase operation 7+2 lead cable, with brake



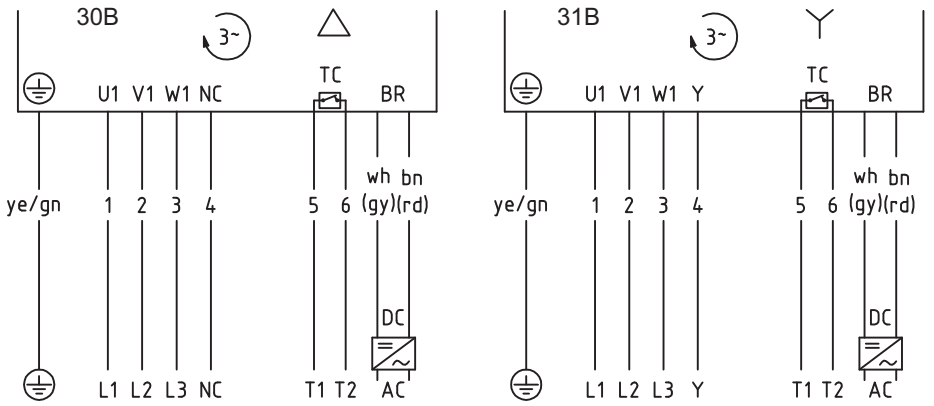
3-phase operation 12 lead cable, winding for 2 voltages, YY or Y connection

YY connection: Low voltage
Y connection: High voltage



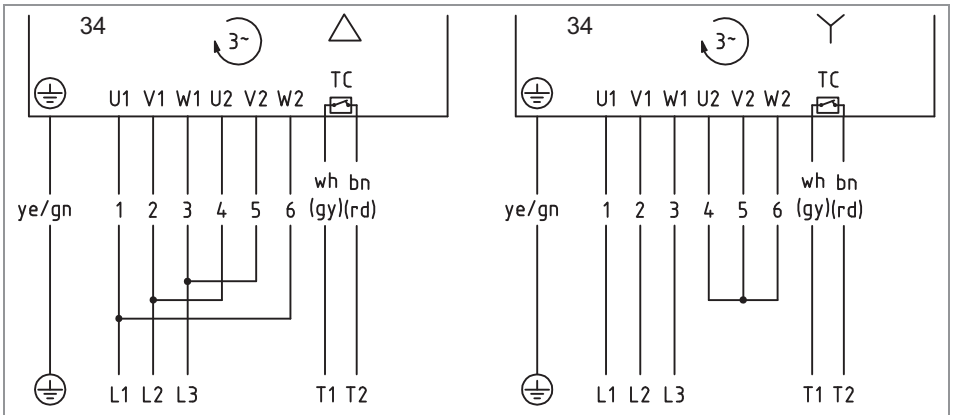
3-phase operation 4+2 lead cable, winding for 1 voltage, delta or star connection (internally connected)

Delta connection: Low voltage
Star connection: High voltage



3-phase operation 7+2 lead cable, winding for 1 voltage, delta or star connection (internally connected), with brake

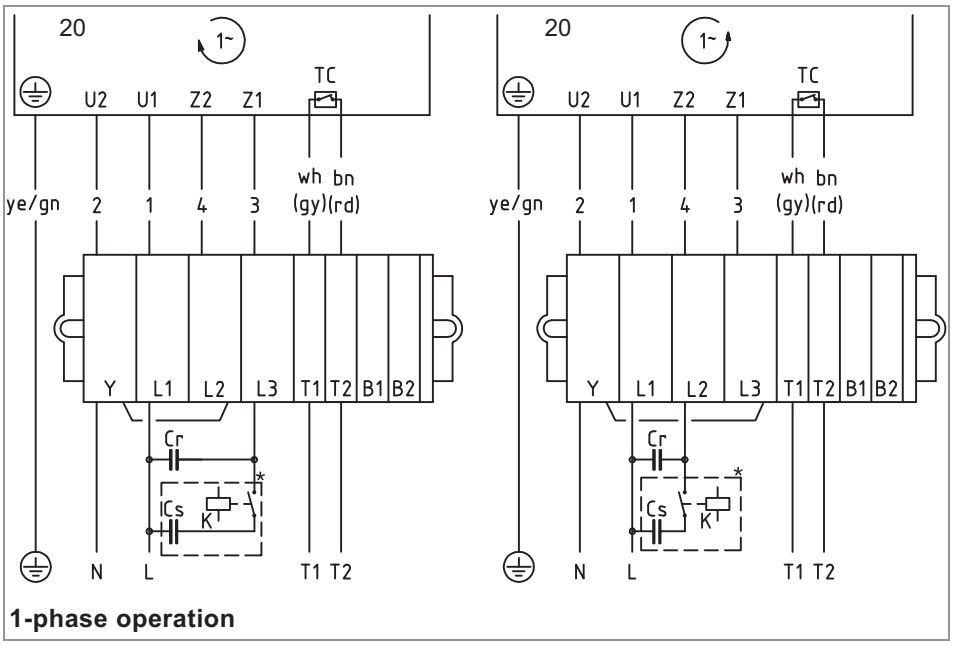
Delta connection: Low voltage
Star connection: High voltage



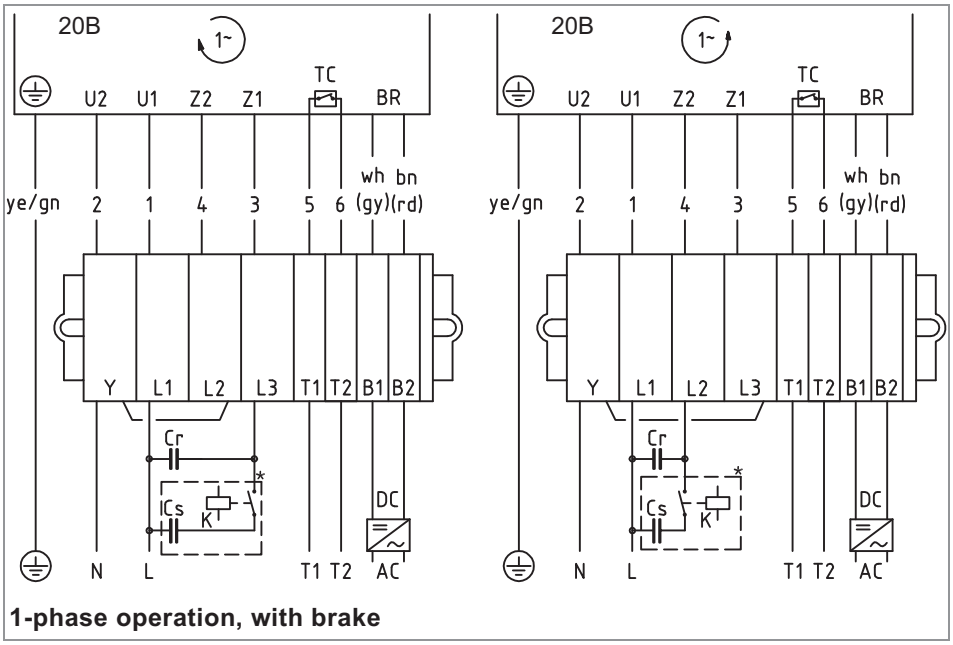
3-phase operation 7+2 lead cable, winding for 2 voltages, delta or star connection

Delta connection: Low voltage
Star connection: High voltage

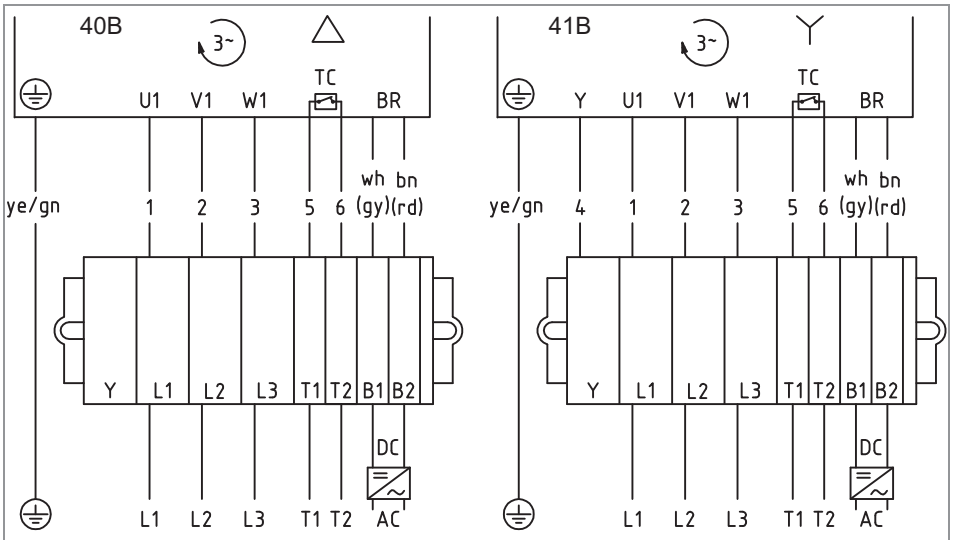
Terminal Box connections



1-phase operation

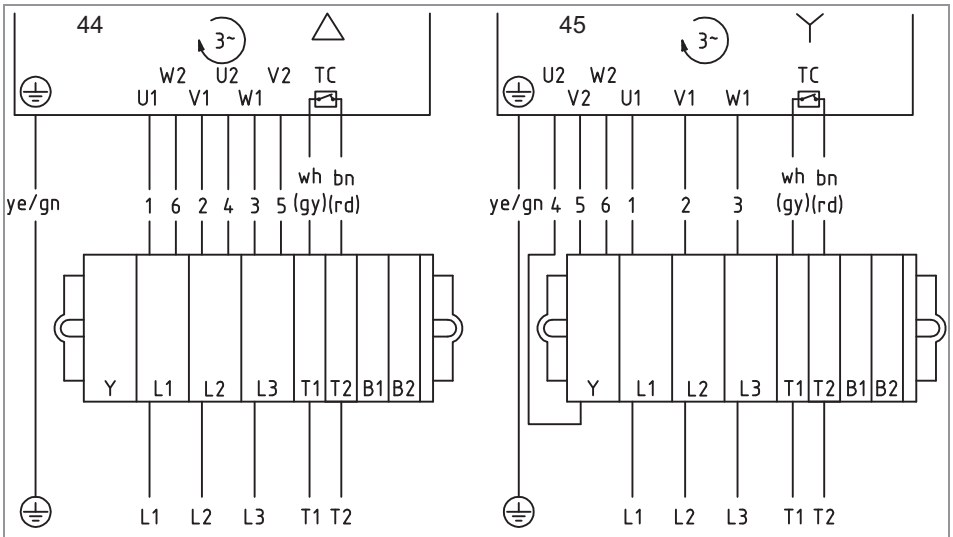


1-phase operation, with brake



3-phase operation, winding for 1 voltage, delta or star connection (internally connected), with brake

Delta connection: Low voltage
Star connection: High voltage

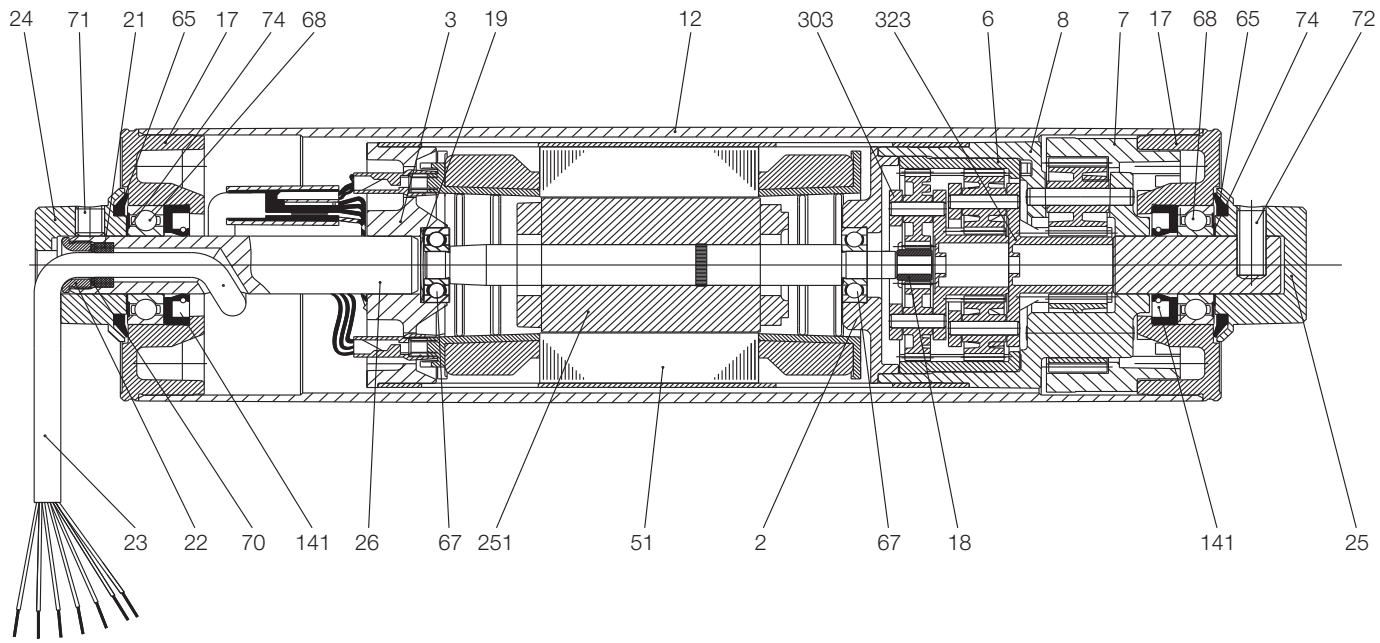


3-phase operation, winding for 2 voltages, delta or star connection

Delta connection: Low voltage
Star connection: High voltage

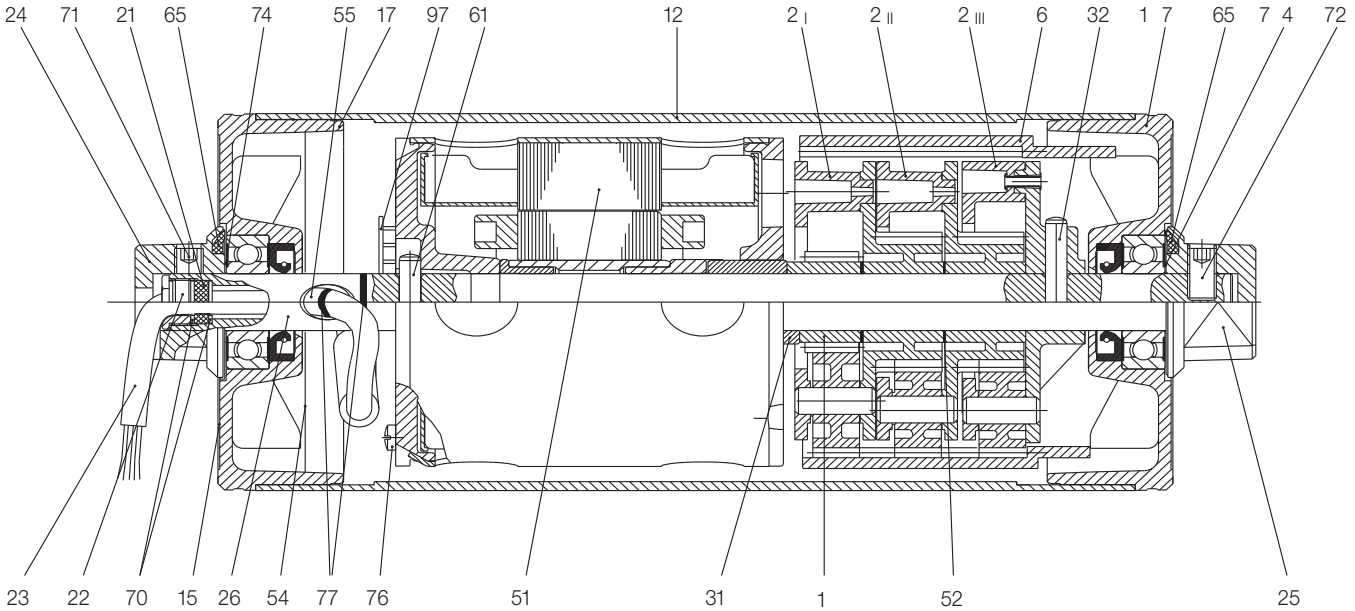
Product information S-series

Components of the S-series Drum Motor



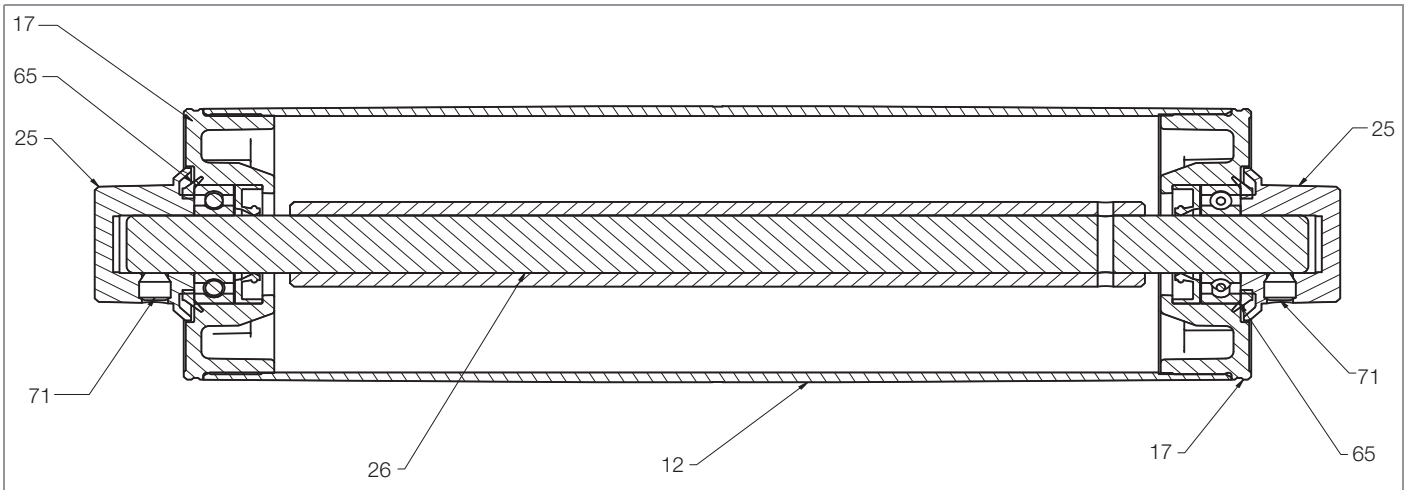
80S

2	Gear shield	21	Rubber bushing	68	Bearing 6003 2RS
3	Shaft shield	22	Pressure nipple	70	Washer
6	Ring gear z 60	23	Cable	71	Stop screw M8 x 8 mm
7	Ring gear z 48	24	Shaft end cap (open)	72	Stop screw M8 x 20 mm
8	Gearhouse	25	Shaft end cap (closed)	74	Spacer
12	Shell	26	Rear shaft	141	Oil seal
17	Bearing house	51	Stator	251	Rotor
18	Rotor pinion	65	Lip seal	303	Gear stage 1
19	Spring washer	67	Bearing 608 2RS	323	Gear stage 2



113S

1	Input pinion	24	Shaft cap open	61	Pin
2	Gear stages I, II, and III	25	Shaft cap closed	65	Lip seal
6	Ring gear z 60	26	Shaft	70	Washer
12	Shell	31	Coupling	71	Stopscrew
15	Motor label	32	Gear pin	72	Stopscrew
17	Bearing House	51	Electrical motor/rotor	74	Spacer
21	Rubber bushing	52	Flat washer	76	Screw for earth
22	Pressure nipple	54	Protection disk	77	Cable restrainer
23	Cable	55	Isolation	97	Terminal lock

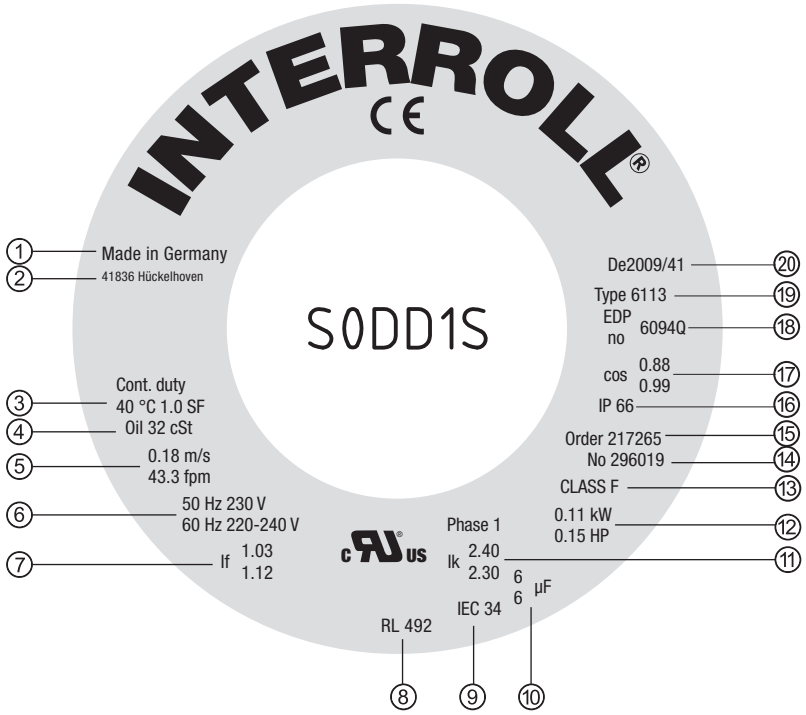


Idler Pulley S-series

12	Shell	25	Shaft end cap (closed)	65	Lip seal
17	End housing	26	Shaft	71	Stop screw M8 x 8 mm

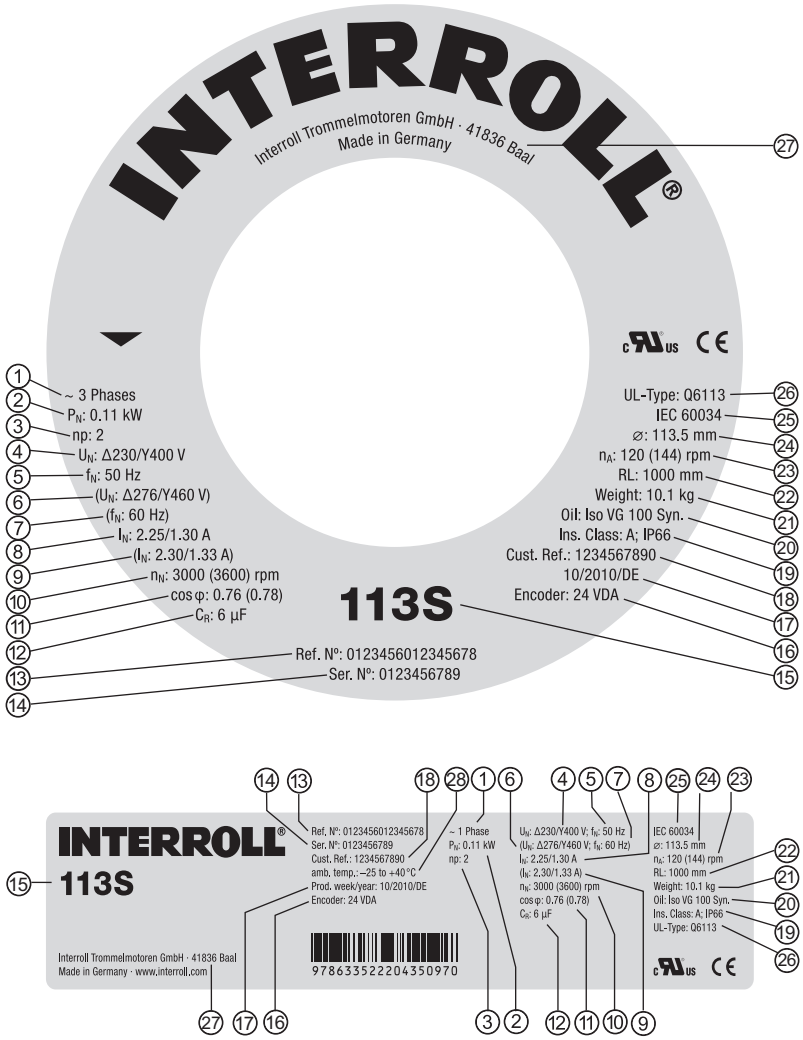
Label of the S-series Drum Motor

The specifications on the Drum Motor label are used to identify the Drum Motor. This is required to use the Drum Motor as intended.



Label for S-series up to August 2011

① Country of production
② Place of production
③ Max. ambient temperature and service factor
④ Oil type
⑤ Drum speed
⑥ Rated voltage and frequency
⑦ Rated current
⑧ Roller / shell length
⑨ International Electrical Commission: Standard for Drum Motor
⑩ Capacitor value
⑪ Blocked motor current
⑫ Rated power
⑬ Insulation class
⑭ Serial number
⑮ Order number
⑯ Protection rating
⑰ Power factor
⑱ Article no.
⑲ Type of Drum Motor
⑳ Country and date of production



Label for S- series from September 2011

① Number of phases
② Rated power
③ Number of poles
④ Rated voltage
⑤ Rated freqency
⑥ Rated voltage [1)]
⑦ Rated freqency [1)]
⑧ Rated current
⑨ Rated current [1)]
⑩ Rated speed of rotor [1)]
⑪ Power factor [1)]
⑫ Run capacitor
⑬ Reference number
⑭ Serial number
⑮ Type
⑯ Specifications of encoder or brake
⑰ Date and country of production
⑱ Customer reference number
⑲ Insulation class and protection rating
⑳ Oil type
㉑ Weight
㉒ Roller / shell length
㉓ Rated revolutions of the shell [1)]
㉔ Max. diameter of the shell
㉕ International Electrical Commission: Standard for Drum Motor
㉖ Type of UL standard
㉗ Place of production
㉘ Ambient temperature range

[1)] Value depends on the given voltage. All values in brackets refer to the rated voltage in brackets.

Electrical data for S-series

Explanation of abbreviations

P_N in kW	Rated power	M_S/M_N	Ratio of starting torque to rated torque
np	Number of poles	M_P/M_N	Ratio of pull-up torque to rated torque
n_N in rpm	Rated speed of rotor	M_B/M_N	Ratio of break-down torque to rated torque
f_N in Hz	Rated frequency	M_N	Rated torque of rotor
U_N in V	Rated voltage	R_M in Ω	Phase resistance
I_N in A	Rated current	$U_{SH\ delta}$ in V	Preheating voltage in delta connection
cos φ	Power factor	$U_{SH\ star}$ in V	Preheating voltage in star connection
η	Efficiency	$U_{SH\ \sim}$ in V	Preheating voltage in single phase
J_R in kgcm^2	Rotor moment of inertia	C_r in µF	Run capacitor
I_S/I_N	Ratio of starting current to rated current		

80S 1-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} ~	C_r
kW		min^{-1}	Hz	V	A			kgcm^2					Nm	Ω	V DC	µF
0.025	4	1320	50	230	0.39	1.00	0.28	1.2	2.2	1.11	1.37	1.11	0.18	150.0	44	3
0.05	2	2750	50	230	0.54	1.00	0.40	0.9	3.1	0.94	1.71	0.94	0.17	82.0	33	3
0.075	2	2750	50	230	0.68	1.00	0.48	1.0	3.2	0.74	1.37	0.74	0.26	66.0	34	4
0.085	2	2750	50	230	0.73	0.98	0.53	1.3	5.2	0.93	1.60	0.93	0.30	52.0	28	6
0.11	2	2750	50	230	0.94	1.00	0.51	1.2	2.0	0.73	1.15	0.73	0.38	51.0	36	8

80S 3-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			kgcm^2					Nm	Ω	V DC	V DC	µF
0.04	4	1320	50	230	0.71	0.65	0.21	1.0	1.8	1.60	1.60	1.60	0.29	105.0	15		10
				400	0.43	0.65	0.21	1.0	1.8	1.60	1.60	1.60	0.29	105.0		44	10
0.05	2	2750	50	230	0.46	0.57	0.47	1.0	4.6	3.82	3.82	3.82	0.17	74.2	10		-
				400	0.22	0.71	0.45	1.0	4.4	2.35	2.53	2.35	0.17	342.0		80	-
0.06	4	1320	50	230	0.79	0.65	0.29	1.0	1.8	1.60	1.60	1.60	0.43	105.0	16		11
				400	0.46	0.65	0.29	1.0	1.8	1.60	1.60	1.60	0.43	105.0		47	11
0.075	2	2820	50	230	0.51	0.69	0.53	1.0	4.6	2.50	2.50	2.50	0.25	74.2	13		-
				400	0.30	0.70	0.51	1.0	4.5	2.50	2.50	2.50	0.25	226.0		71	-
0.085	2	2800	50	230	0.53	0.73	0.55	1.0	4.6	2.24	2.24	2.24	0.29	74.2	14		-
				400	0.32	0.74	0.52	1.0	4.5	2.24	2.24	2.24	0.29	226.0		80	-

113S 1-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} ~	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	µF
0.06	4	1300	50	230	0.74	0.98	0.36	2.3	2.6	1.29	2.60	1.29	0.44	63.5	35	4
0.08	6	890	50	230	1.35	0.99	0.26	4.0	1.9	0.70	1.65	0.70	0.86	45.9	46	8
0.09	4	1300	50	230	0.99	0.91	0.43	2.3	2.4	1.24	2.42	1.24	0.66	42.5	29	6
0.11	4	1300	50	230	1.13	0.88	0.48	3.2	2.9	1.06	2.31	1.06	0.81	32.5	24	6

113S 3-phase

P_N	np	n_N	f_N	U_N	I_N	cos φ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	U_{SH} delta	U_{SH} star	C_r
kW		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
0.04	8	720	50	230	0.64	0.58	0.27	3.9	1.5	1.59	1.59	1.49	0.53	125.0	13		9
				400	0.37	0.58	0.27	3.9	1.5	1.59	1.59	1.49	0.53	125.0		40	9
0.11	6	865	50	230	1.05	0.67	0.39	4.0	2.2	2.24	2.35	2.24	1.21	30.0	11		15
				400	0.62	0.62	0.41	4.0	2.0	3.14	3.35	3.14	1.21	92.0		53	15
	4	1365	50	230	0.80	0.73	0.47	2.3	3.6	3.38	3.39	3.38	0.77	84.0	25		11
				400	0.45	0.75	0.47	2.3	3.6	3.41	3.42	3.41	0.77	84.0		43	11
		1384	50	230	0.80	0.70	0.51	3.6	1.3	1.73	1.73	1.73	0.76	92.5	15		11
				400	0.45	0.70	0.51	3.6	1.3	1.73	1.73	1.73	0.76	92.5		44	11
0.16	4	1350	50	230	0.98	0.76	0.54	3.3	4.0	3.22	3.33	3.22	1.13	59.2	22		14
				400	0.57	0.75	0.54	3.3	4.0	3.25	3.35	3.25	1.13	59.2		38	14
		1384	50	230	0.99	0.76	0.53	3.9	1.7	1.73	1.73	1.73	1.10	64.1	14		14
				400	0.57	0.76	0.53	3.9	1.7	1.73	1.73	1.73	1.10	64.1		42	14
0.18	4	1355	50	230	1.00	0.77	0.59	4.0	4.4	3.54	3.74	3.54	1.27	45.5	18		14
				400	0.62	0.76	0.55	4.0	4.4	3.60	3.79	3.60	1.27	45.5		32	15
		1383	50	230	0.98	0.76	0.55	5.6	3.7	1.76	2.08	1.76	1.24	47.0	11		15
				400	0.62	0.76	0.55	5.6	3.7	1.76	2.08	1.76	1.24	47.0		33	15
0.33	2	2800	50	230	1.74	0.76	0.68	3.3	4.5	3.57	3.57	2.62	1.13	21.5	8		-
				400	0.93	0.76	0.68	3.3	4.5	3.57	3.57	2.62	1.13	21.5		23	-

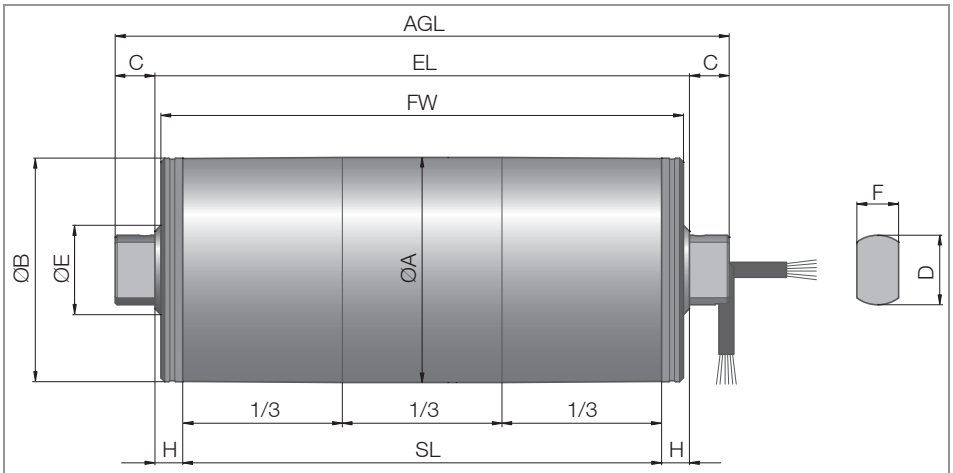
Dimensions of the S-series Drum Motor

Some of the dimensions are indicated as "SL+". SL is an abbreviation for shell length. It can be generated from RL, which is indicated on the Drum Motor label (*see "Label of the i-series Drum Motor", page 18*). For Drum Motors 80S and 113S RL is equal to FW.

- For Drum Motor 80S: SL = RL - 10
- For Drum Motor 113S: SL = RL - 22

All length dependant dimensions shown in the catalogue and this user manual are in accordance with DIN/ISO 2768 (medium quality).

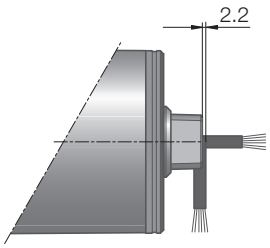
The recommended distance between the fixing brackets (EL) to allow for maximum thermal expansion and internal tolerances is EL + 2 mm.



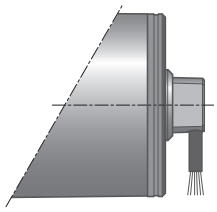
Dimensions of 80S

Type	A mm	B mm	C mm	D mm	E mm	F mm	H mm	FW mm	EL mm	AGL mm
80S crowned SL 270 to 612 mm	81.5	80	20	35	45	21	8	SL+10	SL+16	SL+56
80S crowned SL 612 to 962 mm	83	81	20	35	45	21	8	SL+10	SL+16	SL+56
80S cylindrical SL 270 to 612 mm	80.5	80.5	20	35	45	21	8	SL+10	SL+16	SL+56
80S cylindrical SL 612 to 962 mm	83	83	20	35	45	21	8	SL+10	SL+16	SL+56
113S crowned	113.3	112.5	20	35	45	21	14	SL+22	SL+28	SL+68
113S cylindrical	113.3	113.3	20	35	45	21	14	SL+22	SL+28	SL+68

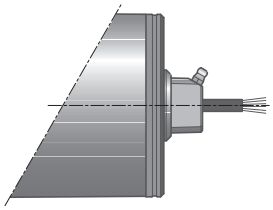
Shaft caps and cable connectors



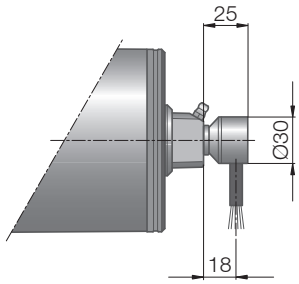
Standard shaft cap, aluminium



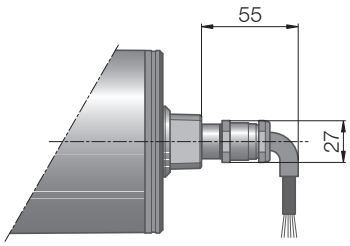
Shaft cap with cable protection



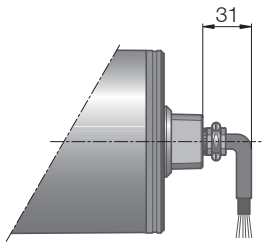
Regreasable shaft cap with straight connector, stainless steel



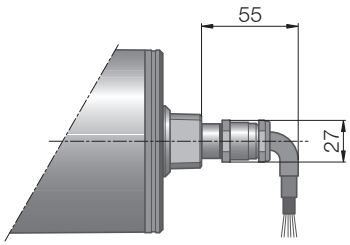
Regreasable shaft cap with elbow connector, stainless steel



Gland with screened cable, blue tube

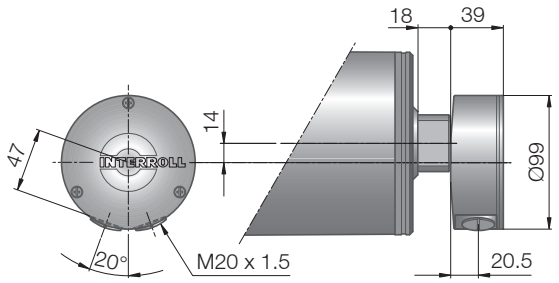


Gland with copper stocking

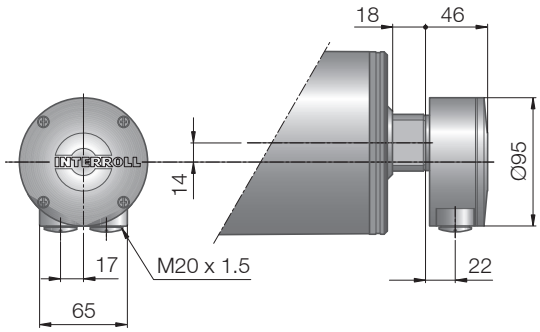


Gland with copper stocking, blue tube

Terminal box



Stainless steel terminal box



Aluminium terminal box

Connections Diagrams S-series

Only standard connection diagrams are shown in ths manual. For other connections the connection diagram will be supplied seperately together with the Drum Motor.

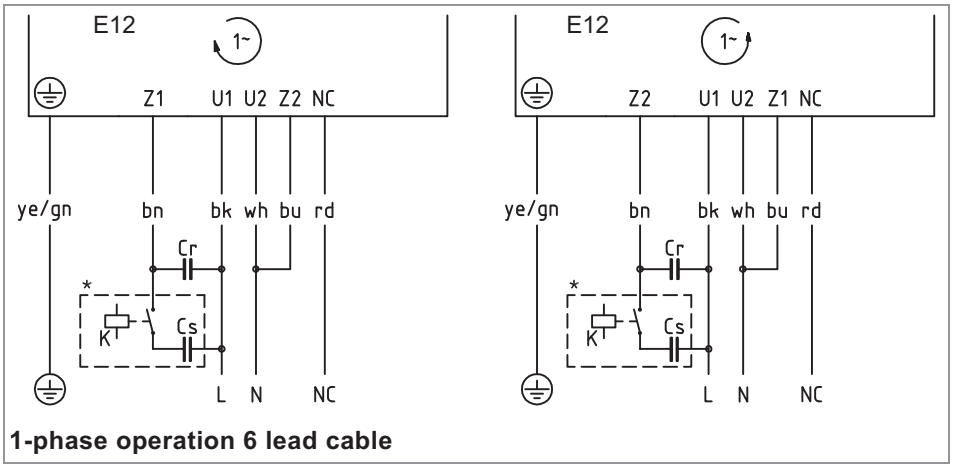
Explanation of abbreviations:

TC: Thermal control	1~: 1-phase motor	Cr: Capacitor run
BR: Brake option	3~: 3-phase motor	Cs: Capacitor start
NC: not connected		

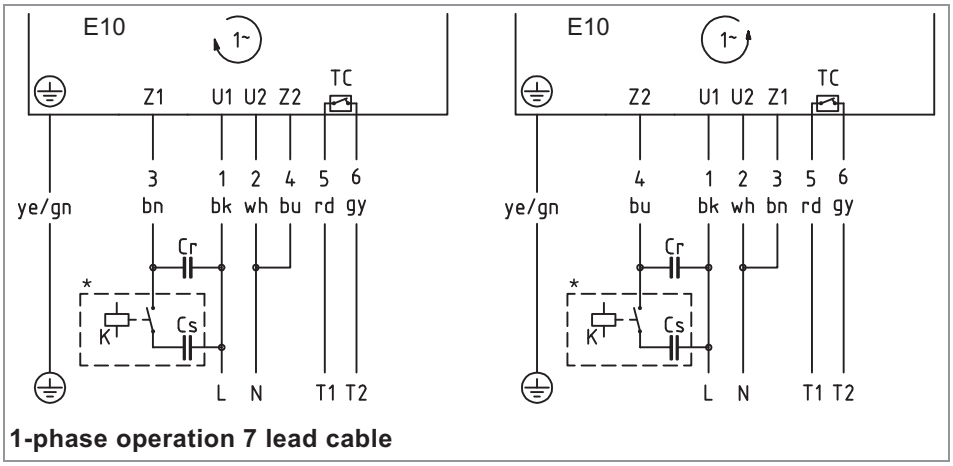
Color codes:

rd: red	gy: grey	wh: white
ye: yellow	gn: green	or: orange
bu: blue	bn: brown	vi: violet
bk: black	pk: pink	( ): alternative color

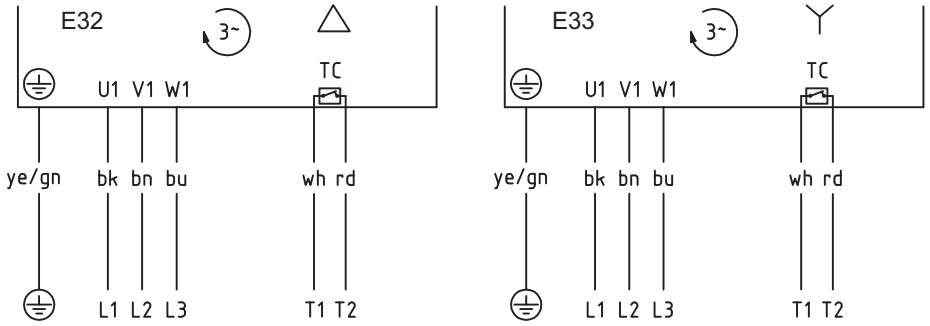
Cable connections



1-phase operation 6 lead cable

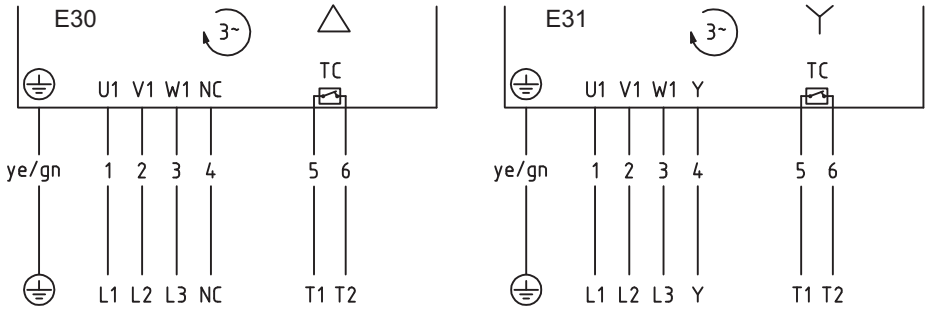


1-phase operation 7 lead cable



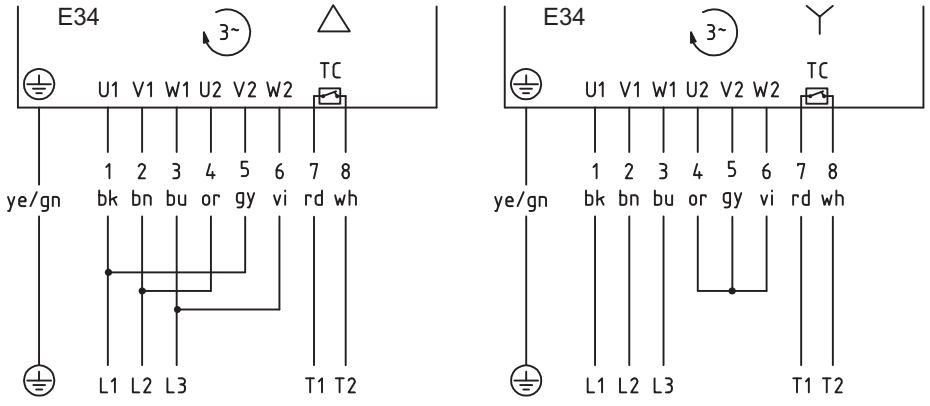
3-phase operation 6 lead cable, winding for 1 voltage, delta or star connection (internally connected)

Delta connection: Low voltage
Star connection: High voltage



3-phase operation 7 lead cable, winding for 1 voltage, delta or star connection (internally connected)

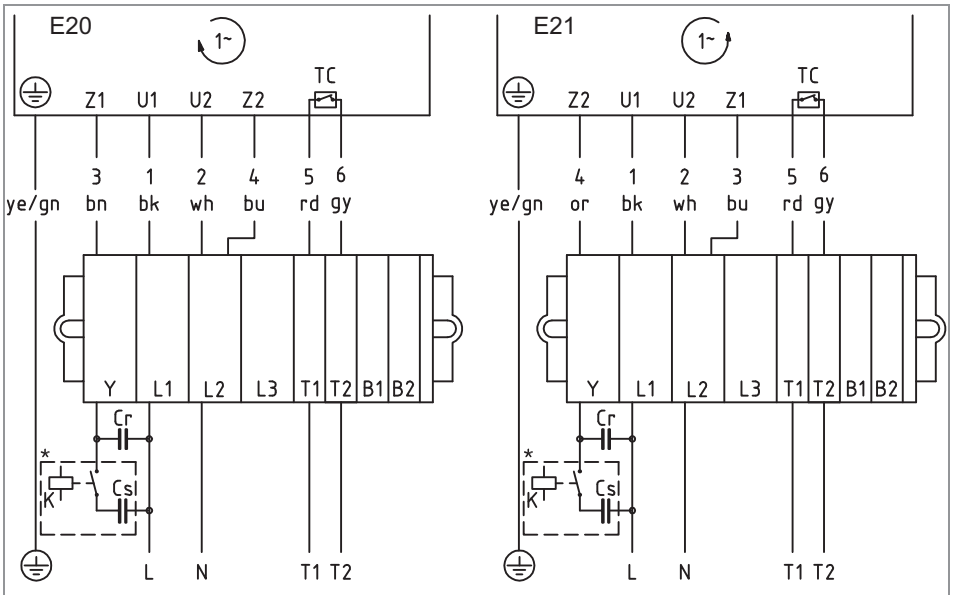
Delta connection: Low voltage
Star connection: High voltage



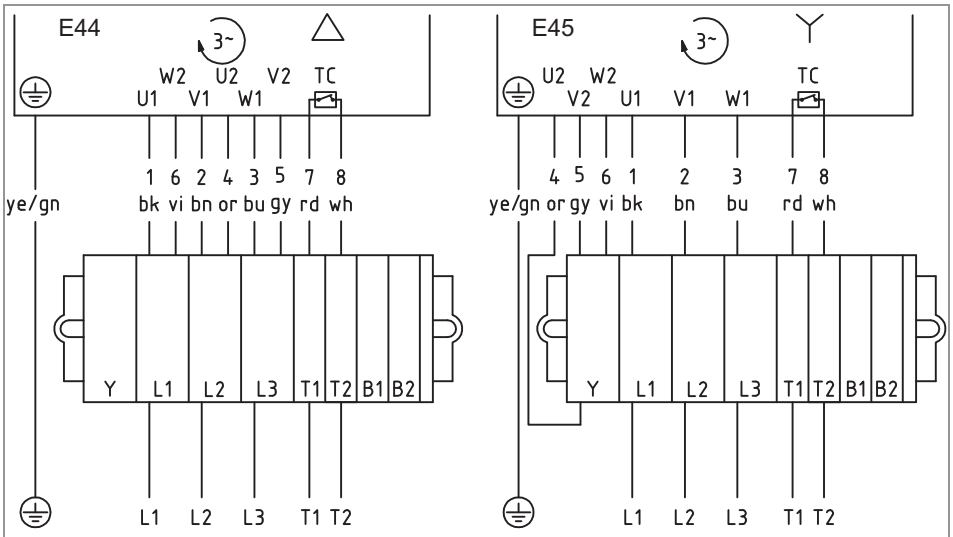
3-phase operation 9 lead cable, winding for 2 voltages, delta or star connection

Delta connection: Low voltage
Star connection: High voltage

Terminal Box connections



1-phase operation 7 lead cable

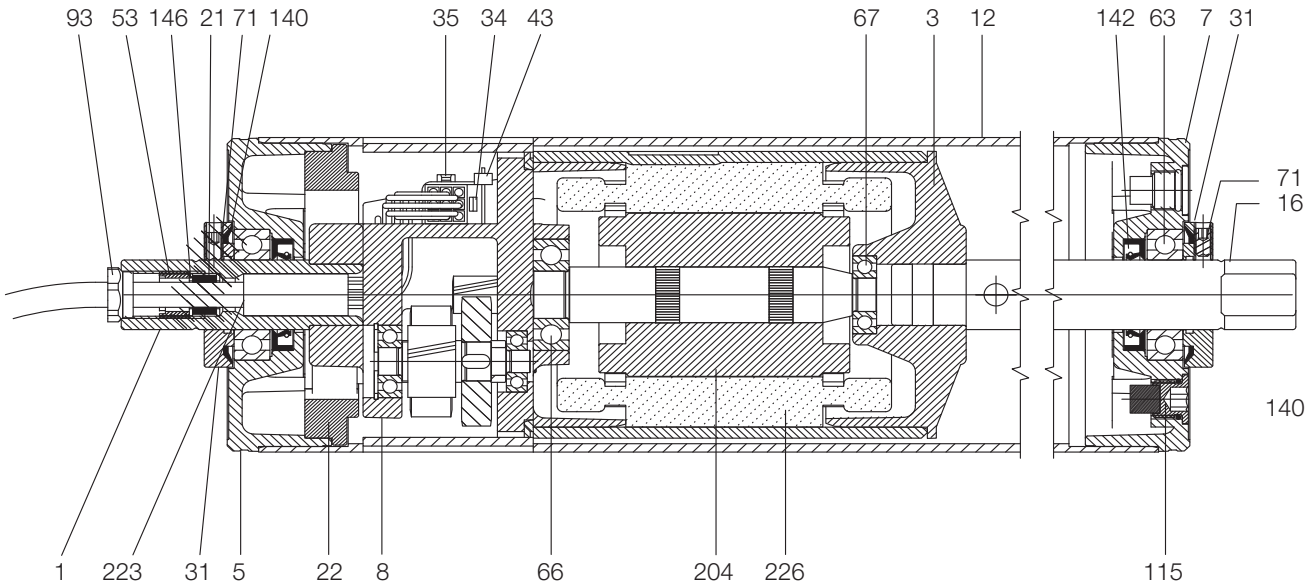


3-phase operation 9 lead cable, winding for 2 voltages, delta or star connection

Delta connection: Low voltage
Star connection: High voltage

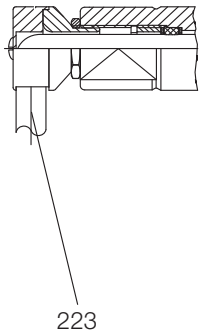
Product information E-series

Components of the E-series Drum Motor



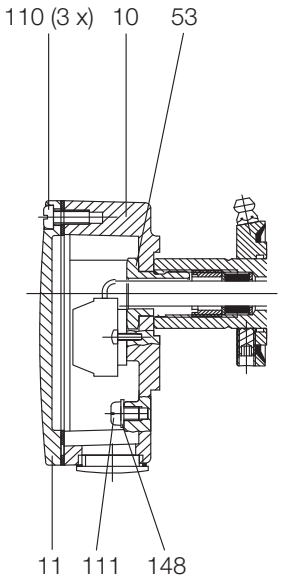
113E

1	Front shaft	31	Seal cover	93	Cable protection
3	Rear flange	34	Male connector	115	Oil plug with magnet
5	Bearing house (gear side)	35	Female connector	140	Labyrinth seal
7	Bearing house	43	Strip	142	Endhouse sealing
8	Gearbox	53	Connection nipple	146	Washer (electrical connection)
12	Shell	63	Ball bearing	204	Rotor complete
16	Rear shaft	66	Ball bearing (rotor shaft gear side)	223	Cable
21	Rubber seal	67	Ball bearing (rotor shaft)	226	Stator
22	Geared rim	71	Screw for endcap		



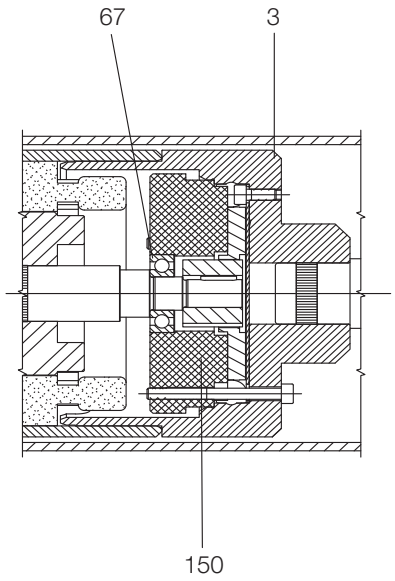
Stainless steel elbow connector

223 Cable



Shaft solution with Terminal box

10 Terminal box
11 Terminal box cover
53 Connection nipple
110 Screw (terminal box - cover)
111 Screw (terminal box - earth)
148 Washer (earth screw - terminal box)

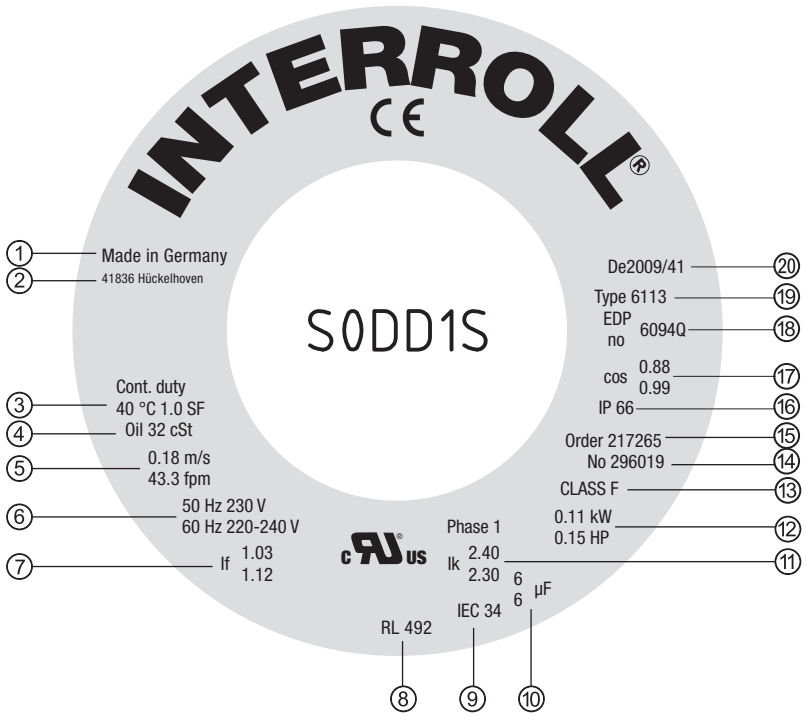


Electromagnetic brake (ELB)

3 Rear flange
67 Ball bearing (rotor shaft)
150 Electromagnetic brake

Label of the E-series Drum Motor

The specifications on the Drum Motor label are used to identify the Drum Motor. This is required to use the Drum Motor as intended.



Label for E-series

① Country of production
② Place of production
③ Max. ambient temperature and service factor
④ Oil type
⑤ Drum speed
⑥ Rated voltage and frequency
⑦ Rated current
⑧ Roller / shell length
⑨ International Electrical Commission: Standard for Drum Motor
⑩ Capacitor value
⑪ Blocked motor current
⑫ Rated power
⑬ Insulation class
⑭ Serial number
⑮ Order number
⑯ Protection rating
⑰ Power factor
⑱ Article no.
⑲ Type of Drum Motor
⑳ Country and date of production

Electrical data for E-series

Explanation of abbreviations

P_N in kW	Rated power	I_N in A	Rated current
np	Number of poles	R_M in Ω	Phase resistance
n_N in rpm	Rated speed of rotor	R_A in Ω	Auxiliary phase resistance
U_N in V	Rated voltage	C_r in µF	Run capacitor
f_N in Hz	Rated frequency	cos φ	Power factor

113E

P_N	np	n_N	U_N	f_N	I_N	R_M	R_A	C_r	Cos φ	
kW		rpm	V	Hz	A	Ω	Ω	µF		
0.09	8	630	3x230/3x400	50	1.09/0.63	94	–	–	0.63	
0.07	8	756	3x230/3x460	60	0.94/0.59	94	–	–	0.63	
0.07	8	630	3x200/3x346	50	0.94/0.59	94	–	–	0.63	
0.09	8	630	3x230/3x400	50	1.07/0.64	88	–	–	0.63	
0.09	8	756	3x230/3x460	60	0.92/0.59	88	–	–	0.57	
0.18	4	1360	3x230/3x400	50	1.43/0.62	47	–	–	0.76	
0.18	4	1632	3x230/3x460	60	1.23/0.65	47	–	–	0.76	
0.25	4	1360	3x230/3x400	50	1.19/0.68	40.5	–	–	0.76	1)
0.25	4	1632	3x230/3x460	60	1.09/0.60	40.5	–	–	0.71	1)
0.33	4	1360	3x230/3x400	50	1.17/0.71	31.3	–	–	0.68	1)
0.33	4	1632	3x230/3x460	60	0.94/0.65	31.3	–	–	0.62	1)
0.37	2	2750	3x230/3x400	50	1.55/0.89	21	–	–	0.87	
0.37	2	3300	3x230/3x460	60	1.44/0.77	21	–	–	0.80	
0.37	4	1360	3x230/3x400	50	2.1/1.2	21.4	–	–	0.71	
0.37	4	1632	3x230/3x460	60	1.7/1.1	21.4	–	–	0.78	
0.37	2	2750	3x200/3x346	50	1.79/1.03	14.7	–	–	0.82	
0.37	2	3300	3x200/3x346	60	1.72/1.00	14.7	–	–	0.85	
0.37	4	1360	3x200/3x346	50	2.36/1.37	16.4	–	–	0.67	
0.37	4	1632	3x200/3x346	60	2.07/1.18	16.4	–	–	0.76	
0.37	4	1632	3x330/3x575	60	1.54/0.82	34	–	–	0.66	
0.37	4	1360	3x500	50	1.07	34	–	–	0.66	
0.37	4	1360	3x400/3x690	50	1.14	34	–	–	0.69	
0.55	2	2750	3x230/3x400	50	2.3/1.23	17	–	–	0.87	
0.55	2	3300	3x230/3x460	60	2.2/1.1	17	–	–	0.84	
0.55	4	1360	3x230/3x400	50	3.36/1.95	16.4	–	–	0.68	
0.55	4	1632	3x230/3x460	60	2.73/1.75	16.4	–	–	0.64	
0.55	2	2750	3x200/3x346	50	2.5/1.43	12.6	–	–	0.87	
0.55	2	3300	3x200/3x346	60	2.4/1.39	12.6	–	–	0.87	
0.25	4	1360	1x230	50	2.4	12.7	31.1	12	0.97	
0.25	2	2750	1x230	50	1.95	9.5	24.7	10	–	
0.25	4	1360	1x115	60	4.34	–	–	40/80	0.95	
0.25	2	2750	1x115	60	4	–	–	40/80	0.90	

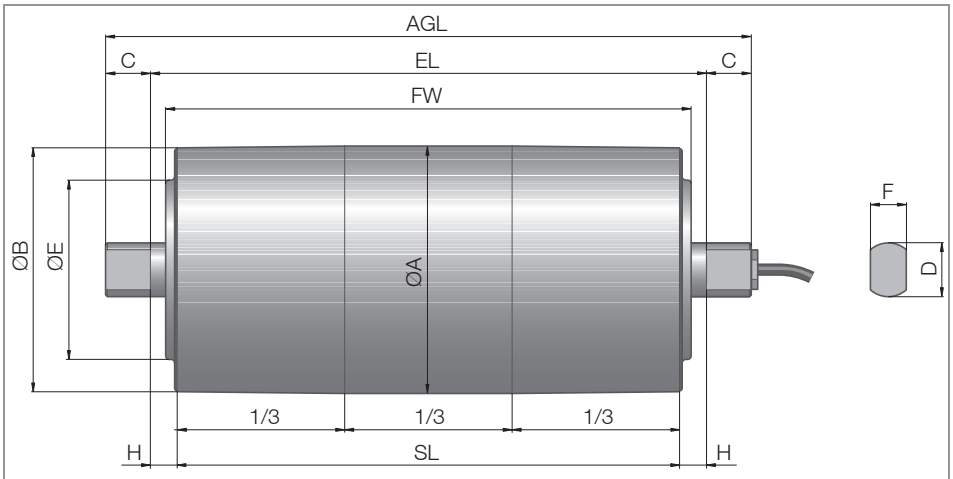
1): Cool motor

Dimensions of the E-series Drum Motor

Some of the dimensions are indicated as "RL+". RL is an abbreviation for roller length. It is indicated on the Drum Motor label (*see "Label of the i-series Drum Motor", page 18*).

All length dependant dimensions shown in the catalogue and this user manual are in accordance with DIN/ISO 2768 (medium quality).

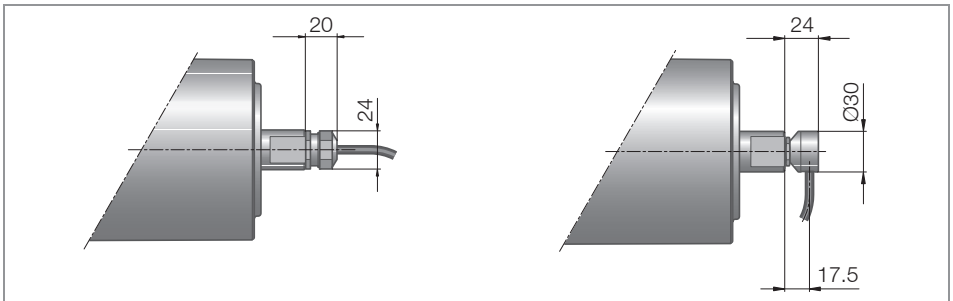
The recommended distance between the fixing brackets (EL) to allow for maximum thermal expansion and internal tolerances is EL + 2 mm.



Dimensions of 113E

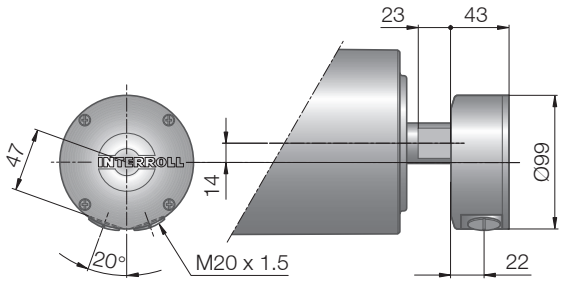
Type	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	EL mm	AGL mm
113E crowned	113.3	112.3	25	25	52	20	8	10	RL+20	RL+70
113E cylindrical	113.3	113.3	25	25	52	20	8	10	RL+20	RL+70

Connectors

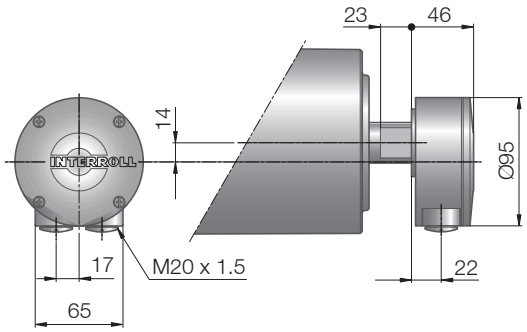


Straight connector, stainless steel **Elbow connector, stainless steel**

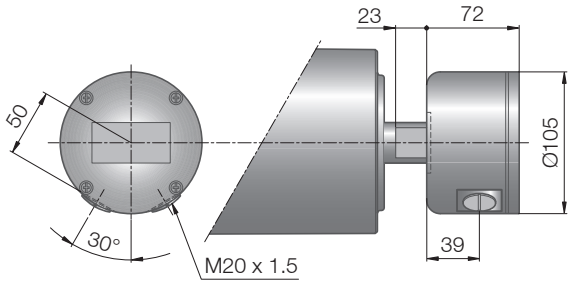
Terminal box



Stainless steel terminal box



Aluminium terminal box



Techno-polymer terminal box

Connections Diagrams E-series

Only standard connection diagrams are shown in ths manual. For other connections the connection diagram will be supplied seperately together with the Drum Motor.

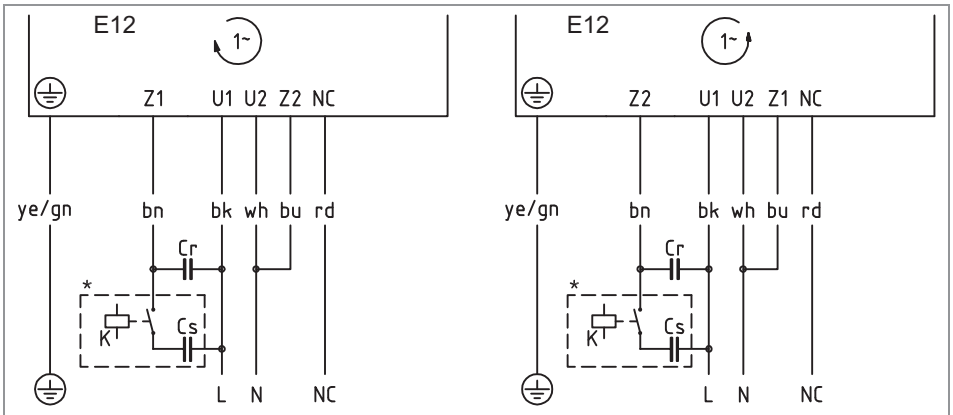
Explanation of abbreviations:

TC: Thermal control	1~: 1-phase motor	Cr: Capacitor run
BR: Brake option	3~: 3-phase motor	Cs: Capacitor start
NC: not connected		

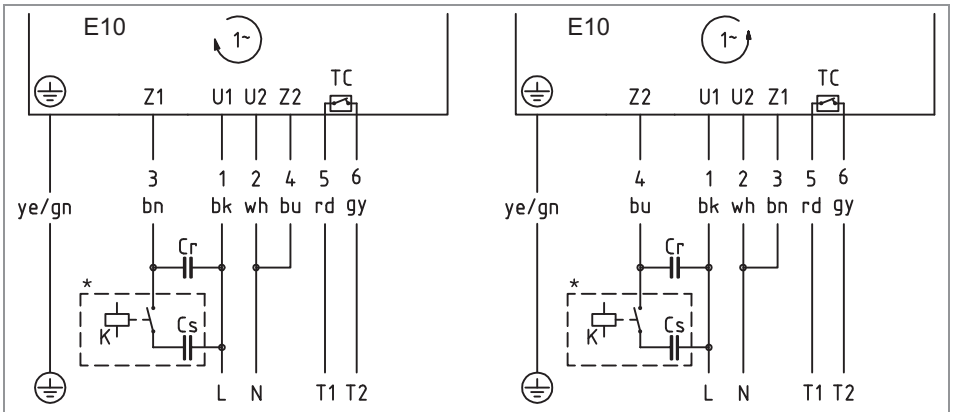
Color codes:

rd: red	gy: grey	wh: white
ye: yellow	gn: green	or: orange
bu: blue	bn: brown	vi: violet
bk: black	pk: pink	( ): alternative color

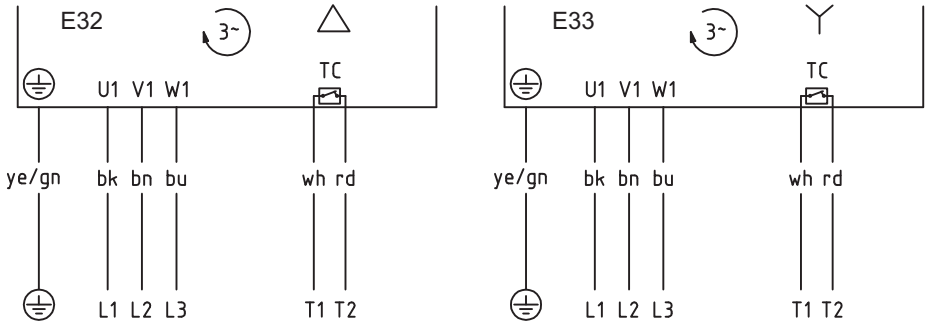
Cable connections



1-phase operation, 6 lead cable

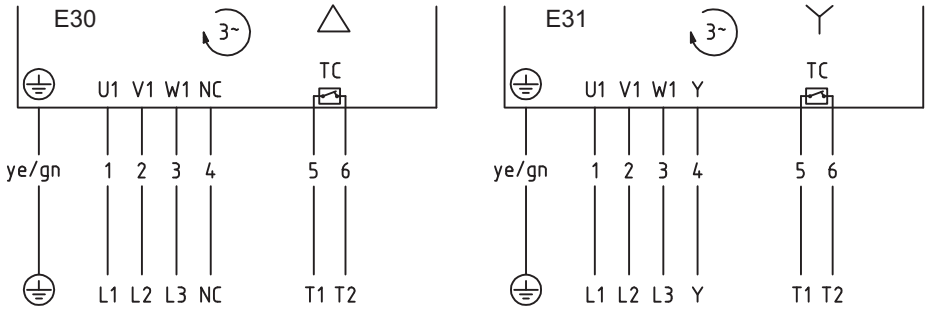


1-phase operation, 7 lead cable



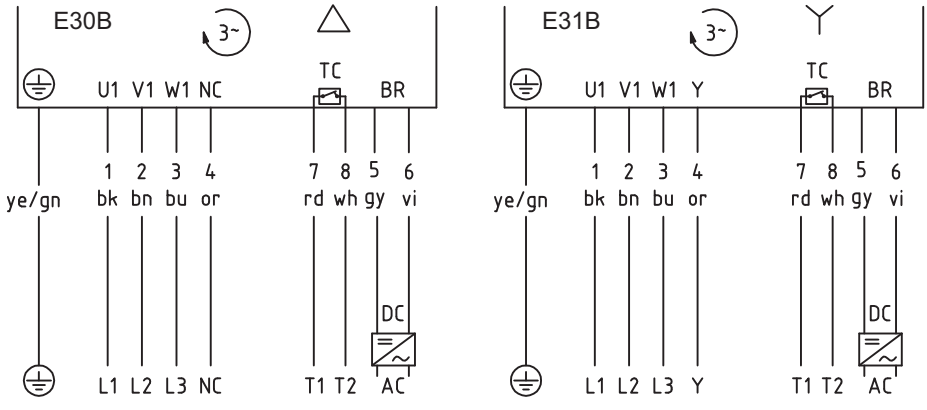
3-phase operation, 6 lead cable, winding for 1 voltage, delta or star connection (internally connected)

Delta connection: Low voltage
Star connection: High voltage



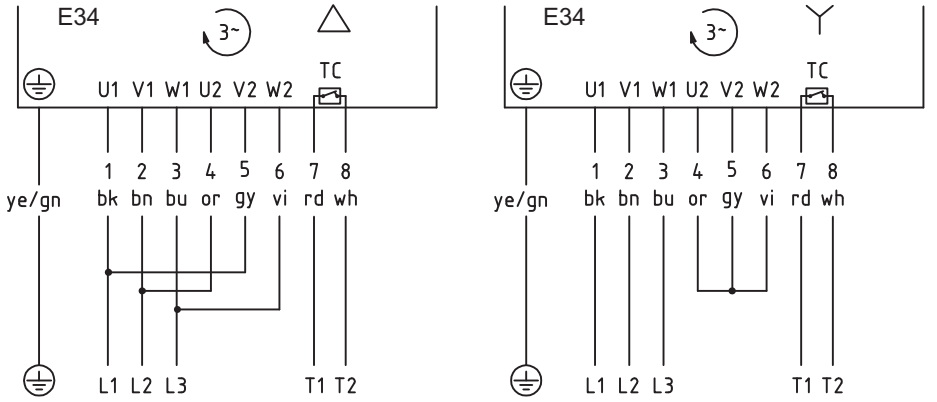
3-phase operation, 7 lead cable, winding for 1 voltage, delta or star connection (internally connected)

Delta connection: Low voltage
Star connection: High voltage



3-phase operation, 7 lead cable, winding for 1 voltage, delta or star connection (internally connected), with break

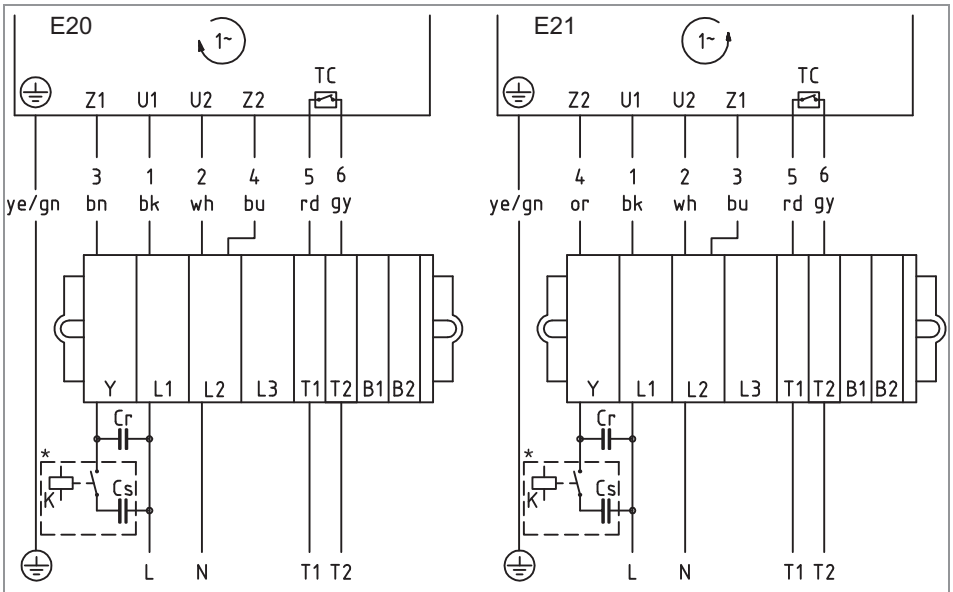
Delta connection: Low voltage
Star connection: High voltage



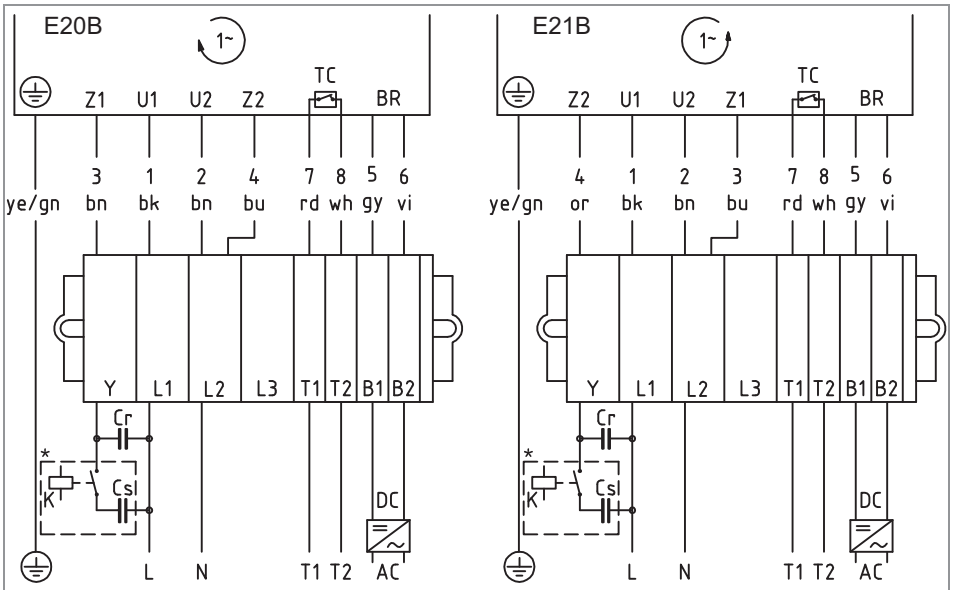
3-phase operation, 9 lead cable, winding for 2 voltages, delta or star connection

Delta connection: Low voltage
Star connection: High voltage

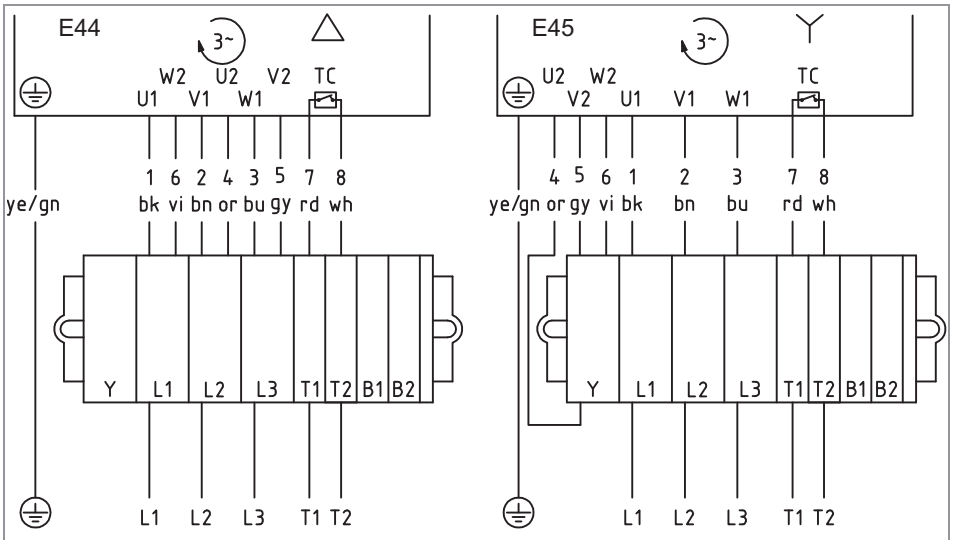
Terminal Box connections



1-phase operation, 7 lead cable

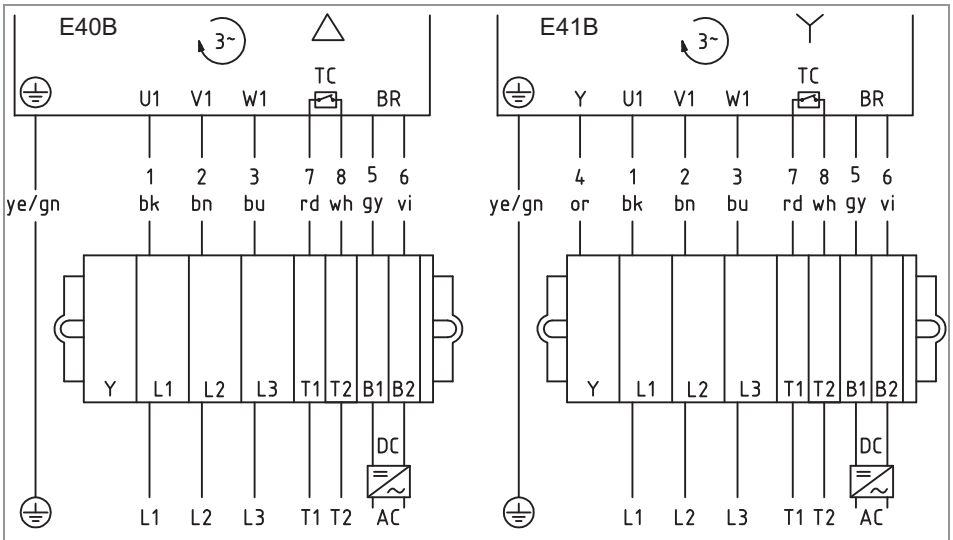


1-phase operation, 9 lead cable, with brake



3-phase operation, 9 lead cable, winding for 2 voltages, delta or star connection

Delta connection: Low voltage
Star connection: High voltage

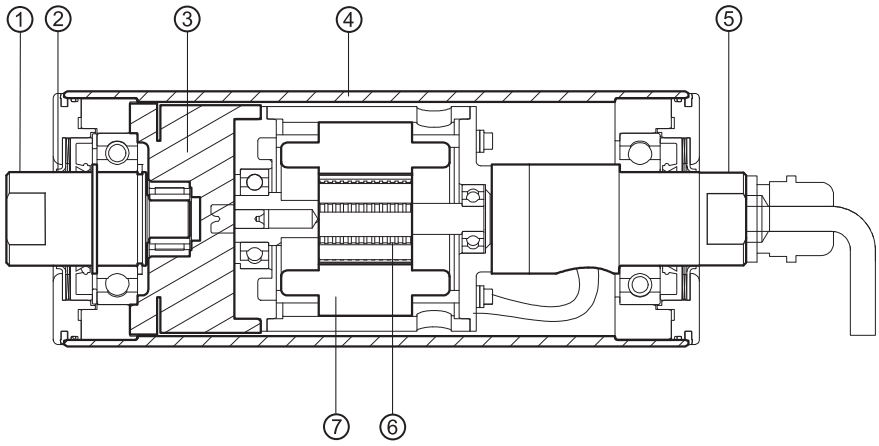


3-phase operation, 9 lead cable, winding for 1 voltage, delta or star connection (internally connected), with brake

Delta connection: Low voltage
Star connection: High voltage

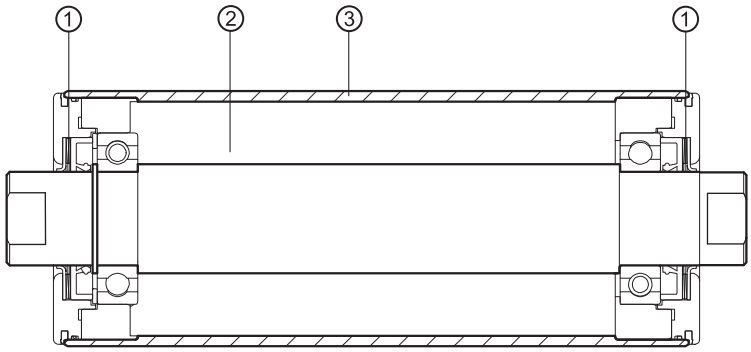
Product information D-series

Components of the D-series Drum Motor



D-series

① Front shaft
② Seal
③ Gear set
④ Drum shell
⑤ Rear shaft
⑥ Rotor
⑦ Stator

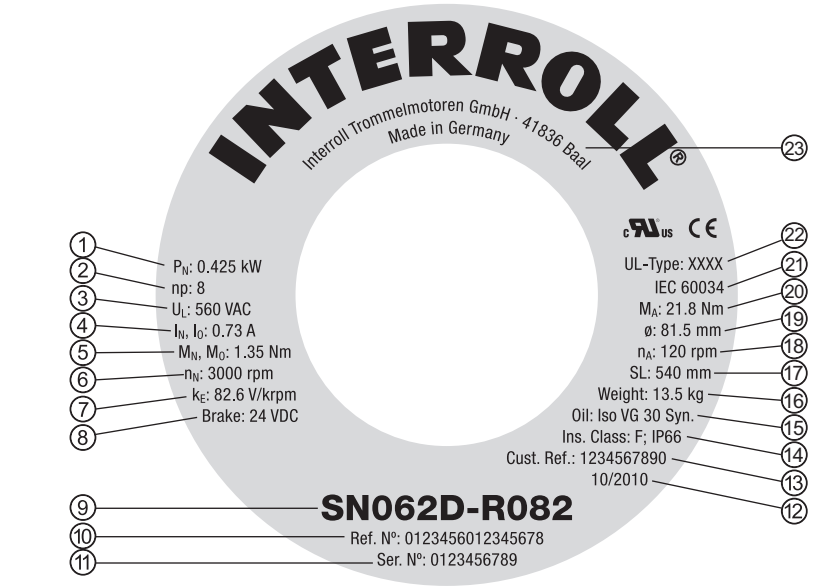


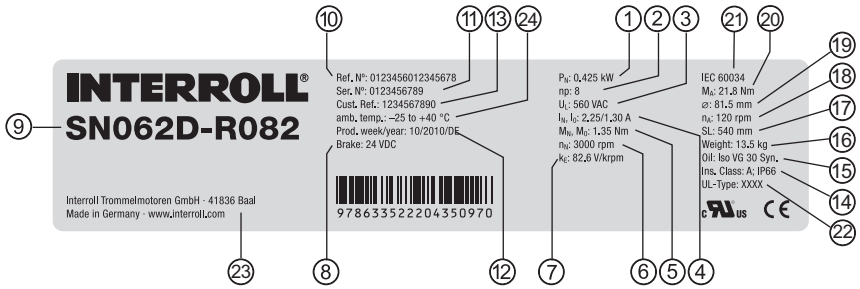
Idler pulley

① Seal
② Shaft
③ Shell

Label of the D-series Drum Motor

The specifications on the Drum Motor label are used to identify the Drum Motor. This is required to use the Drum Motor as intended.





Label for D-series

① Rated Power
② Number of poles
③ DC Link voltage
④ Rated current
⑤ Rated torque of rotor
⑥ Rated speed of rotor
⑦ Induced motor voltage
⑧ Brake voltage
⑨ Type of Drum Motor
⑩ Reference number
⑪ Serial number
⑫ Date of production
⑬ Customer reference number
⑭ Insulation class and protection rating
⑮ Oil type
⑯ Weight
⑰ Shell length
⑱ Rated revolutions of the shell
⑲ Max. diameter of the shell
⑳ Rated torque of Drum motor
㉑ International Electrical Commission: Standard for Drum Motor
㉒ Type of UL standard
㉓ Place of production
㉔ Ambient temperature

Electrical data for D-series

Number of poles	8
Rated speed of rotor	3000 rpm
Rated frequency	200 Hz
Winding connection	Star
Thermal protection type	TC 130 °C

P_N	U_N	I_N	M_N	η	J_R	I_0	M_0	I_{max}	M_{max}	L_{sd}	L_{sq}	R_M	k_e	T_e	k_{TN}	U_{SH}
kW	V	A	Nm		$kgcm^2$	A	Nm	A	Nm	mH	mH	Ω	V/krpm	ms	Nm/A	V
0.14	230	0.81	0.46	0.77	0.14	0.81	0.46	2.43	1.38	45.60	53.70	21.6	41.57	4.97	0.68	25
0.14	400	0.47	0.46	0.77	0.14	0.47	0.46	1.41	1.38	130.7	138.0	54.6	72.26	5.05	0.18	36
0.3	34	9.17	0.95	0.85	0.28	9.17	0.95	27.5	2.85	0.59	0.64	0.26	6.77	4.95	0.10	4
0.3	230	1.30	0.95	0.85	0.28	1.30	0.95	3.90	2.85	27.80	29.25	10.4	47.46	5.64	0.78	19
0.3	400	0.78	0.95	0.85	0.28	0.78	0.95	2.34	2.85	81.90	94.10	29.1	83.14	6.47	1.37	32
0.42	230	2.30	1.35	0.87	0.42	2.30	1.35	6.90	4.05	16.45	19.42	5.78	45.81	6.72	0.76	19
0.42	400	1.32	1.35	0.87	0.42	1.32	1.35	3.96	4.05	49.80	59.00	17.9	80.80	6.59	1.34	33

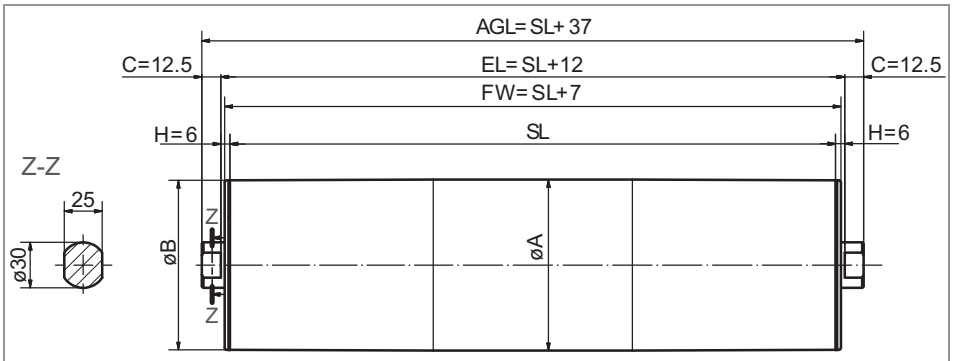
P_N in kW	Rated power	M_{max} in Nm	Maximum torque
U_N in V	Rated voltage	L_{sd} in mH	d-axis inductance
I_N in A	Rated current	L_{sq} in mH	q-axis inductance
M_N in Nm	Rated torque	R_M in Ω	Phase resistance
η	Efficiency	k_e in V/krpm	Induced motor voltage
J_R in $kgcm^2$	Rotor moment of inertia	T_e in ms	Electrical time constant
I_0 in A	Standstill current	k_{TN} in Nm/A	Torque constant
M_0 in Nm	Standstill torque	U_{SH} in V	Pre heating voltage
I_{max} in A	Maximum current		

Dimensions of the D-series Drum Motor

Some of the dimensions are indicated as "SL+". SL is an abbreviation for shell length. It is indicated on the Drum Motor label (*see "Label of the i-series Drum Motor", page 18*).

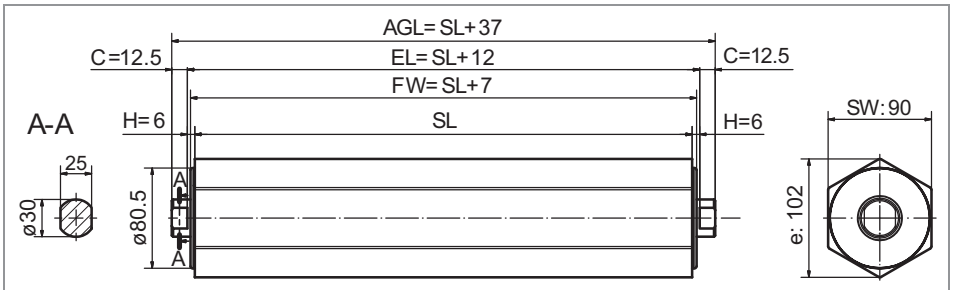
All length dependant dimensions shown in the catalogue and this user manual are in accordance with DIN/ISO 2768 (medium quality).

The recommended distance between the fixing brackets (EL) to allow for maximum thermal expansion and internal tolerances is EL + 2 mm.



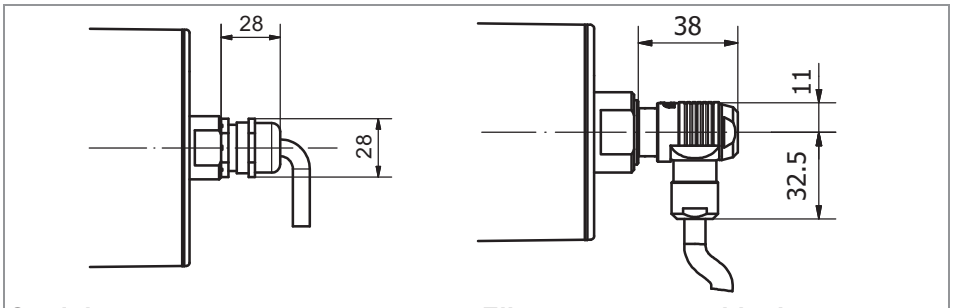
Dimensions of SN082D and SN113D

Type	A mm	B mm
082D	81.5	80.5
113D	113	112

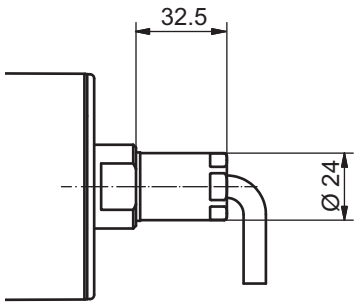


Dimensions of SN102D hex

Connectors



Straight connector **Elbow connector with plug**



Hygienic straight connector

Connections Diagrams D-series

Only standard connection diagrams are shown in ths manual. For other connections the connection diagram will be supplied seperately together with the Drum Motor.

D-series Drum Motors must be connected to a suitable driver or frequency controller and not directly to the mains supply.

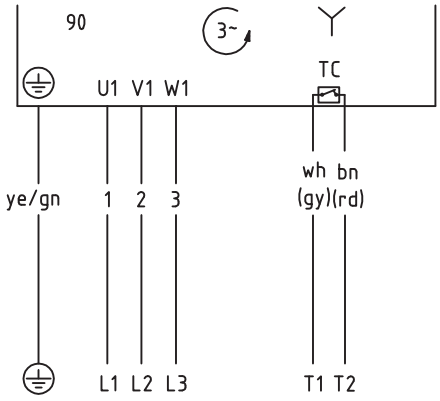
Explanation of abbreviations:

TC: Thermal control	Tr: Transformation ratio	3~: 3-phase motor
BR: Brake option	NC: not connected	

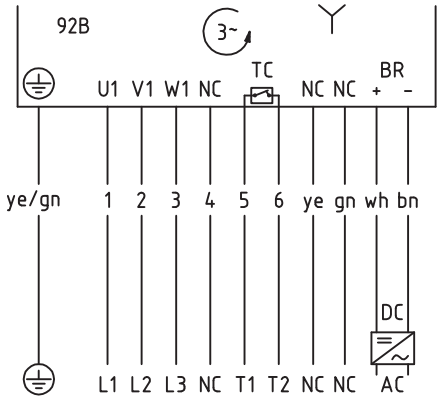
Color codes:

rd: red	gy: grey	wh: white
ye: yellow	gn: green	or: orange
bu: blue	bn: brown	vi: violet
bk: black	pk: pink	( ): alternative color

Cable connections

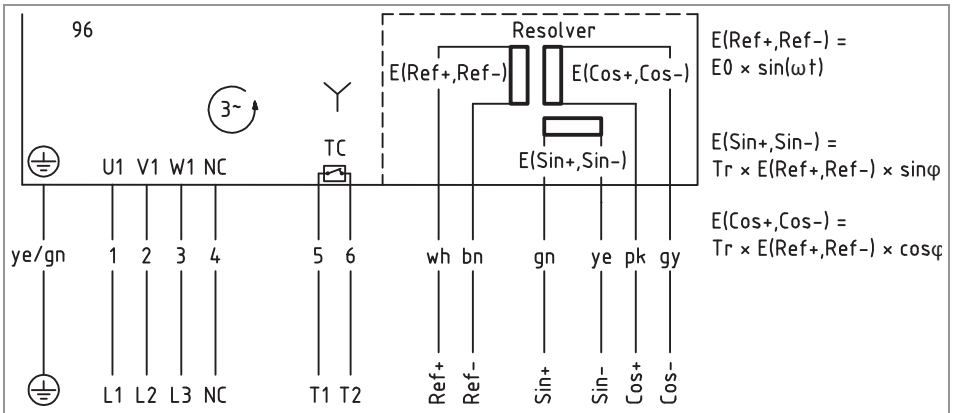


3-phase operation, 4+2 lead cable, winding for 1 voltage, star connection (internally connected)

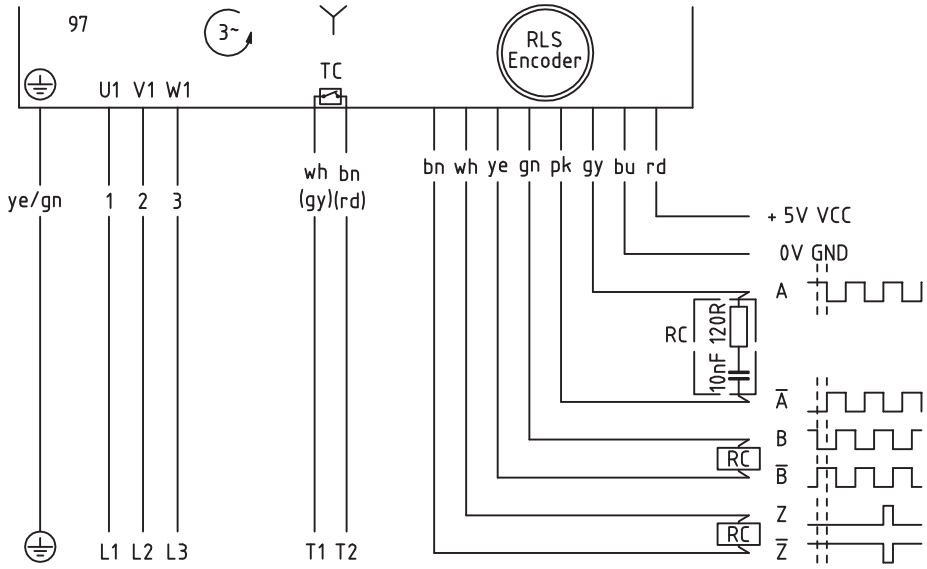


3-phase operation, 7+4 lead cable, winding for 1 voltage, star connection (internally connected), with brake

Encoder connection

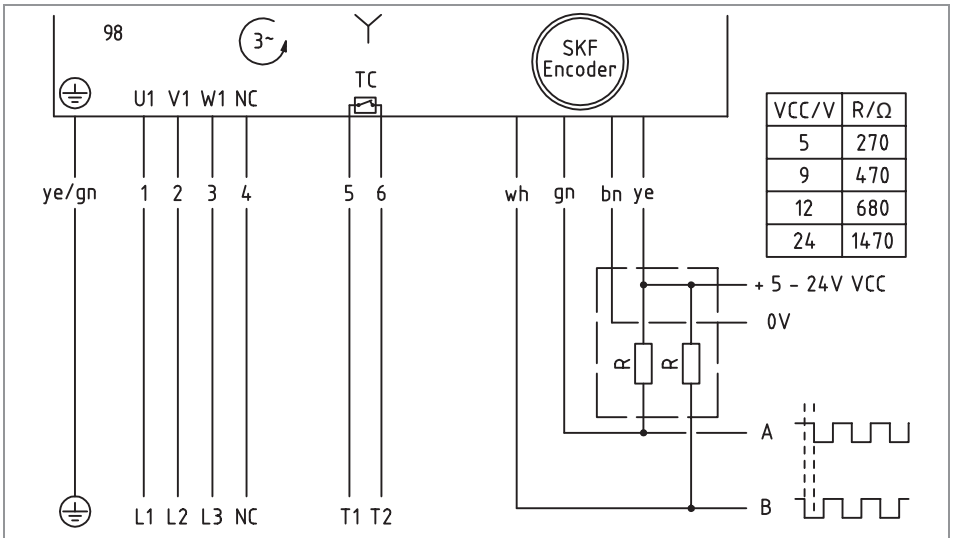


3-phase operation, 7+6 lead cable, winding for 1 voltage, star connection (internally connected), with resolver



3-phase operation, 4+2 and 8 lead cable, winding for 1 voltage, star connection (internally connected), with RLS-encoder

The termination with resistor and capacitor (RC) can reduce noise.



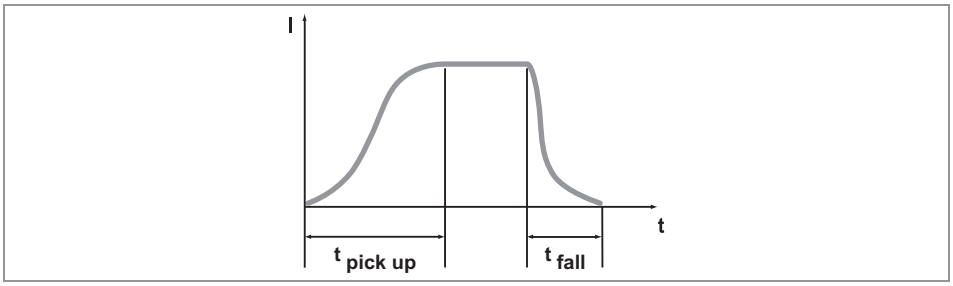
3-phase operation, 7+4 lead cable, winding for 1 voltage, star connection (internally connected), with SKF-encoder

Options and accessories

Electromagnetic brake for i- and E-series

Motor	Brake size	M	J_{BR}	P_{BR}	U_{BR}	I_{BR}	$t_{pick\ up}$	$t_{fall\ delay\ AC}$	$t_{fall\ delay\ DC}$
		Nm	$kgcm^2$	W	VDC	A	ms	ms	ms
80i	2	1.5	0.04	12	24	0.50	20	80	13
					104	**0.12**			
113i	3	3	0.08	17	24	0.71	25	120	20
					104	**0.16**			
					180	0.09			
138i	4	6	0.23	24	24	1.00	30	200	23
					104	0.23			
					180	0.13			
					207	0.12			
165i/ 216i	5	12	0.68	33	24	1.38	40	260	46
					104	**0.32**			
					207	0.16			
217i		26		50	104	0.48	60	500	60
					207	0.24			
315i		50		70	104	0.67	80	700	100
					207	0.34			

Legend	
M	Rated continous torque of the brake
J_{BR}	Self-torque of inertia of the brake
U_{BR}	Rated voltage
P_{BR}	Rated power
I_{BR}	Rated current
$t_{pick\ up}$	Breaking delay time
$t_{fall\ delay\ AC}$	Opening delay time for AC switching
$t_{fall\ delay\ DC}$	Opening delay time for DC switching



AC switching (Terminals 1 and 2 of the brake rectifier)	slow opening response time
	brake voltage approx. 1 V
	slow closing response time
DC switching (Terminals 3 and 4 of the brake rectifier)	fast opening response time
	brake voltage approx. 500 V
	fast closing response time
Electronic rectifier	behavior similary to DC-switching

Over excitation voltage = 2 x nominal operating voltage, divided $t_{pick\ up}$ by two.

Standard 104 VDC, from stock available

The usable brake torque is approximately 35% of the above listed torque according to experience.

All brakes are suitable for frequent start/stop.

The brake opening and closing response times can vary substantially depending on:

- the type and viscosity of the oil
- the level of oil in the drum motor
- the ambient temperature
- the internal motor working temperature

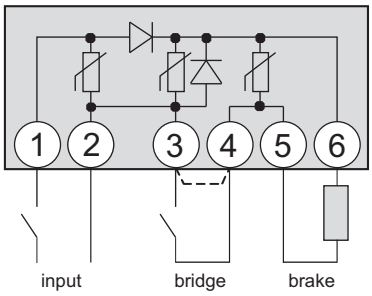
Brake rectifier for i- and S-series

Input voltage V AC	Brake voltage V DC	Starting voltage V DC	Holding voltage V DC	Type	Application	Reference number
115	104	104	52	Fast acting rectifier	Start/stop applications or continuos run applications	BC0005
230	207	207	104	Fast acting rectifier	Start/stop applications or continuos run applications	BC0005
230	104	104	104	Half wave and bridge rectifier	Start/stop applications or continuos run applications	BC0002
230	104	190	52	Phase rectifier	Continuos run applications	BC0004
400	104	180	104	Multiswitch	Start/stop applications or continuos run applications	BC0010
460	104	180	104	Multiswitch	Continuos run applications	BC0010
460	207	207	207	Half wave and bridge rectifier	Start/stop applications or continuos run applications	BC0003

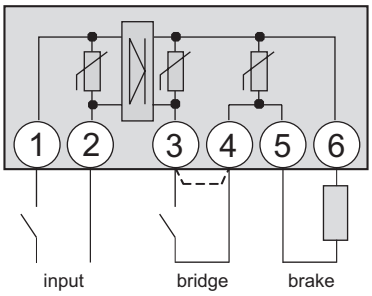
Using a fast acting rectifier or a phase rectifier will save energy because the holding voltage is lower than the starting voltage.

Brake rectifiers - connections

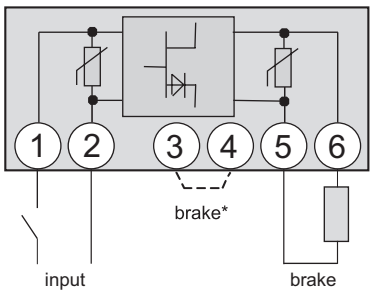
Interroll recommends installing a switch between ③ and ④ for fast brake release.



Half wave rectifier

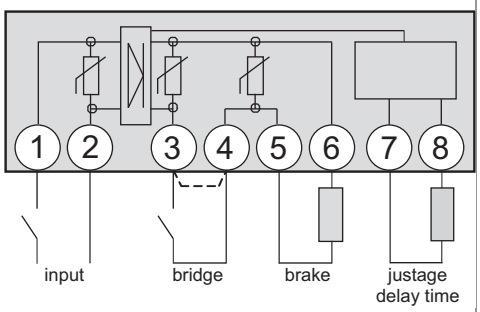


Bridge rectifier

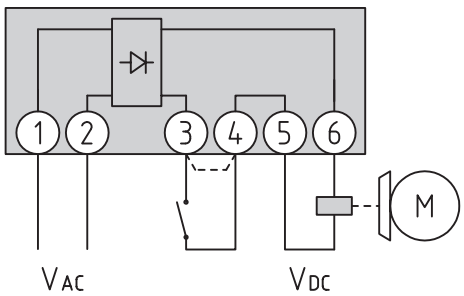


Phase rectifier

Maximum operating cycles = 2 cycle/s
* Link 3/4 will disconnect the DC switching and extend the opening response time

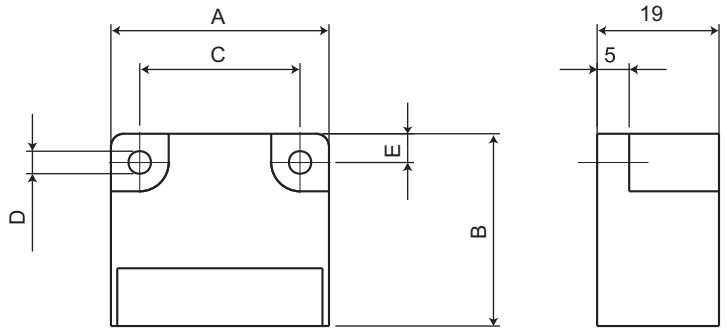


Fast acting rectifier



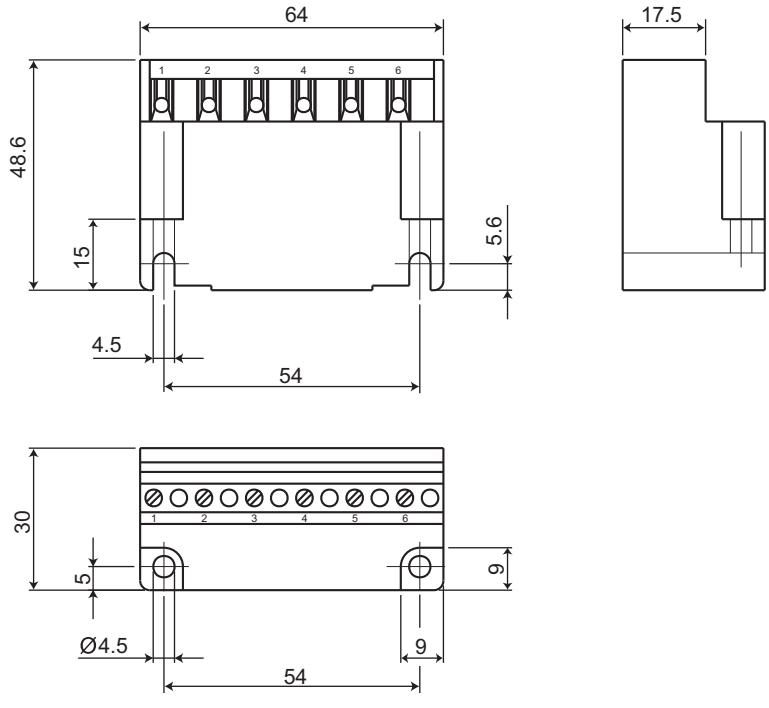
Multiswitch rectifier

Brake rectifiers - dimensions



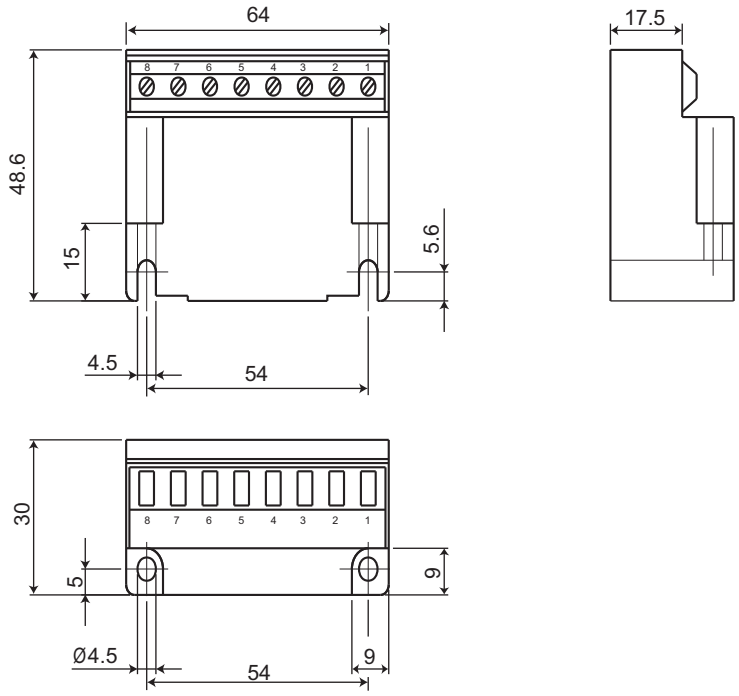
Half wave rectifier / Bridge rectifier

Reference number	A mm	B mm	C mm	D mm	E mm
BC0002	34	30	25	3.5	4.5
BC0003	64	30	54	4.5	5



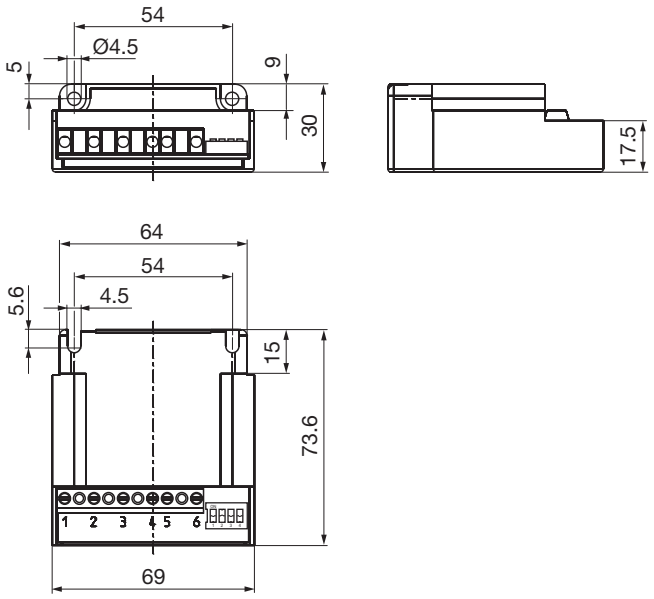
Phase rectifier

Mounting profile 35 mm EN 50022 Mayr art. - no. 1802911



Fast acting rectifier

Mounting profile 35 mm EN 50022 Mayr art. - no. 1802911



Multiswitch rectifier

Electromagnetic holding brake for D-series

The optionally implemented electromagnetic holding brake acts directly on the rotor shaft. Should the power supply be interrupted, the brake will close and hold the drum in position until the power supply is reinstated. The brake will hold a load according to the maximum stated belt pull for the drum motor.

Characteristics:

- Directly applied to the Drum Motor's rotor shaft
- For holding a load according to the stated belt pull
- Suitable for inclined and declined conveyors
- Operated by an external rectifier
- Operating temperature range from -10 °C to +120 °C

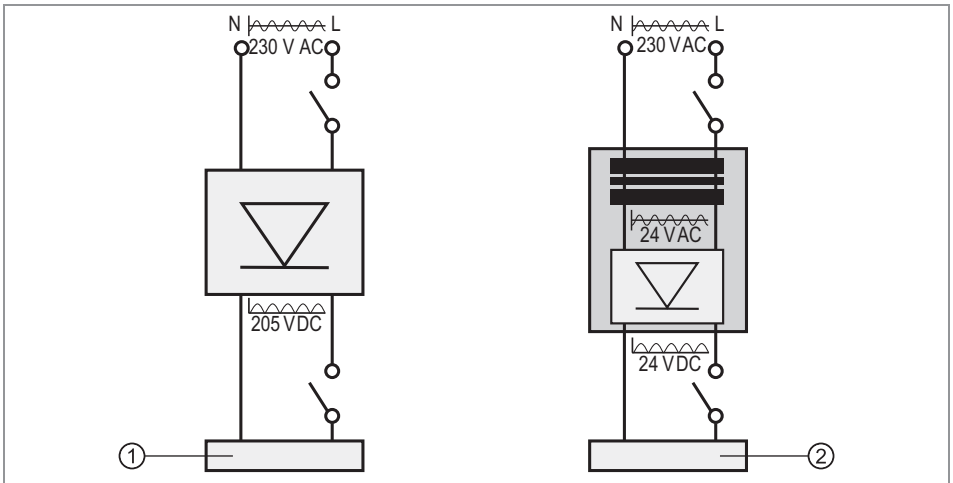
- Combination of Brake and Encoder is not possible.
- The nominal brake torque is strongly influenced by the operation conditions within a drum motor and the ambient temperature. For security, the given brake torque should be reduced by 50 % for load calculations.

Brake type	Rated brake torque Nm	Rated power W	Rated supply voltage V DC	Rated current mA
24	1.5 to 2.8	12	24	500
205	2.1 to 6.0	12	205	52

Braking delay time is depending on switching at input (AC switching) or at output (DC switching) of the rectifier. DC switching is much faster but produces high voltage peaks (500 to 1200 V).

Opening delay time can be shortened by using fast acting or phase rectifiers, which are available on request. Double over excitation voltage to open the brake shortens the opening delay time by half.

The built in **brake disc** is a wear part and has a limited lifetime depending on the operational conditions. In case of premature wear the operation conditions have to be checked and evaluated. Product warranty does not include wear parts of the brake.



① 205 V Brake ② 24 V Brake

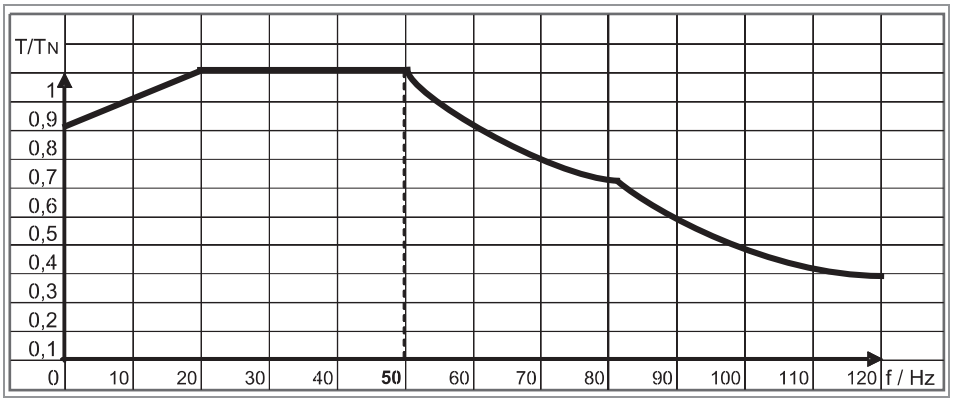
Brake rectifier for D-series

Maximum input voltage U_{in} V AC	Maximum interrupting voltage V AC	Rated output voltage V DC	Rated output current A	Type	Reference number
275	450	0.45 x U_{in}	1.2	Half wave rectifier	0291010-CEMV 0291010-CE07
275	450	0.9 x U_{in}	2.0	Bridge rectifier	0291020-CE07
500	900	0.45 x U_{in}	1.2	Half wave rectifier	0491010-CE07 0491010-CEA7
500	900	0.9 x U_{in}	2.0	Bridge rectifier	0491020-CE07 0491020-CEA7
600	1000	0.9 x U_{in}	1.2	Half wave rectifier	0591010-CE09
720	1600	0.9 x U_{in}	1.2	Half wave rectifier	0691010-CE09

For connection and dimension diagrams refer to Instruction manual for KEB Combitron 91 rectifier (available at www.keb.de).

Asychronous Drum motors working with frequency converters

Torque as a function of the input frequency



Operating frequency Hz		5	10	15	20	25	30-50	55	60	65	70	75	80	85	90	95	100	105	110	115	120
		available motor torque in %																			
Rated motor frequency	50 Hz	80	85	90	95	100	100	91	83	77	71	67	63	58	51	46	42	38	34	32	29
	60 Hz	75	80	85	90	95	100	100	100	92	86	80	75	71	68	63	60	55	50	45	42

Value 1: based on motor nominal frequency 50Hz

Value 2: based on motor nominal frequency 60 Hz

The dependency of torque as shown in the figure above is written as P = T x ω. With decreasing operating frequency less than 20/24 Hz, motor torque derating is provoked by changed heat removal. The power loss transfer is different in nature from standard ventilated motors affected by the oil volume. The hyperbolic character of the power equation written above supersedes to quadratic when driven with frequencies above 80…85 / 95...100 Hz affected by break-down torque and voltages influences. The output voltage/frequency curve of most of 3 x 400V / 3 x 460V supplied frequency converters can be set to 230 V / 50 Hz to connect 230 V motors. This practice generates additional motor power loss which increases abnormal heating up.

Frequency converter parameters

- **Clock frequency:** A high clock frequency leads to a better capacity factor of the motor. Optimal frequencies are 8 or 16 kHz. Parameters such as cycling testing quality (round run of the motor) and noise creation also profit from high frequencies.
- **Voltage increase:** Interroll motor-windings are designed for a nominal voltage increase speed of 1 kV/µs. If a frequency converter produces a steeper voltage increase, motor throttles can be installed between the frequency converter and motor. However, since all Interroll drum motors run in an oil bath, there is very little danger of overheating or damaging the motor due to steep voltage increase. If in doubt, please refer to your local Interroll distributor.
- **Voltage:** If a single phase input frequency converter is installed with the drum motor, ensure that the motor specified is supplied and connected for the used input voltage!
- **Output frequency:** Care should be taken with applications using output frequencies above 87/100 Hz. High frequencies can cause noise, vibration and resonance and will reduce the nominal torque output of the motor. Care should also be taken when using converters with frequencies under 25 Hz where overheating and loss of power to the motor could occur. If in doubt, please refer to your local Interroll distributor.
- **Motor performance:** Not all frequency converters are able to control motors with more than 6 poles and/or output powers under 0.2 KW / 0.25 HP. If in doubt, please refer to your local Interroll distributor or frequency converter supplier.
- **Frequency converter parameters:** Frequency converters are usually delivered with a set of standard parameters. This allows the frequency converter to be ready for use immediately. However, these standard parameters may not be specifically optimized for your motor and therefore, it may be necessary to adjust the parameters for a specific motor.

Encoder type BMB-6202-SKF for i-series

Producer: SKF

This encoder consists of two components: a standard-sized bearing with embedded magnetic encoder. The resolution INC is dependent upon bearing size and thus dependent on Drum Motor size.

The resolution INC in increments per drum revolution can be calculated as follows:

INC = p x gear ratio (i)

The gear ratio (i) can be found in the main Drum Motor catalogue.

p = The number of encoder pulses per rotor revolution selected according to the following table:

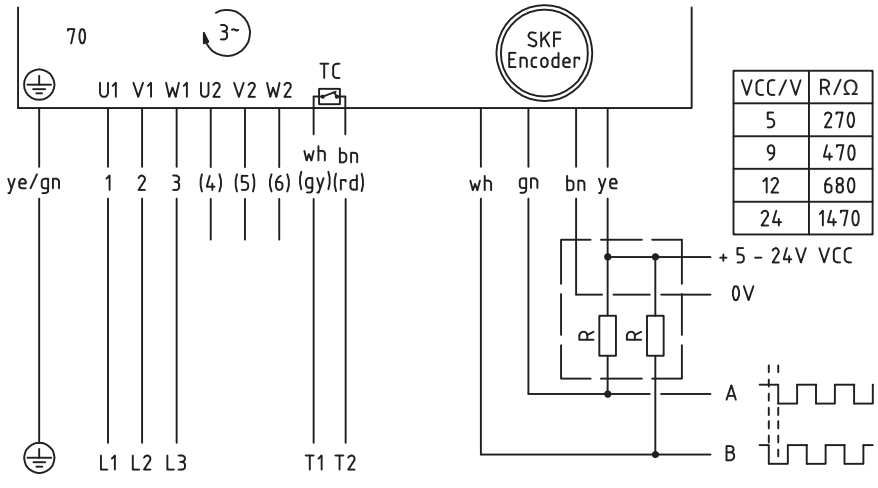
Encoder type	Bearing size	Drum Motor size	Pulses per rotor revolution (p)
EB-6202-SKF-HTLOC-32-N-0,5	6202	80i ... 138i [1)]	32
EB-6205-SKF-HTLOC-48-N-0,5	6205	165i ... 216i	48

[1)]On 80i only available with a special shaft diameter of 25 mm.

Technical data

Rated operational voltage	4.5 to 24 VDC
Rated output current max.	20 mA
Operating current max.	8 ... 10 mA
Pulses (p) per revolution	32/48
High level voltage	> 3.5 V
Low level voltage	< 0.1 V

Connections



3-phase operation, 4+2 and 4 lead cable, winding for 1 voltage, delta or star connection

Option: 2 voltages with 7+2 cable available

The signal sequence of A and B depends on the gear ratio of the drum motor. Therefore the rotation direction can be different for drum motors with the same number of poles and power but different speed. In this case the signal cables A and B can be interchanged.

Encoder type RM44-RLS for i-series

Output: Incremental, RS422A 5 V, Push-Pull 24 V

The resolution INC in increments per drum revolution can be calculated as follows:

INC = p x i

p = Number of encoder pulses per rotor revolution

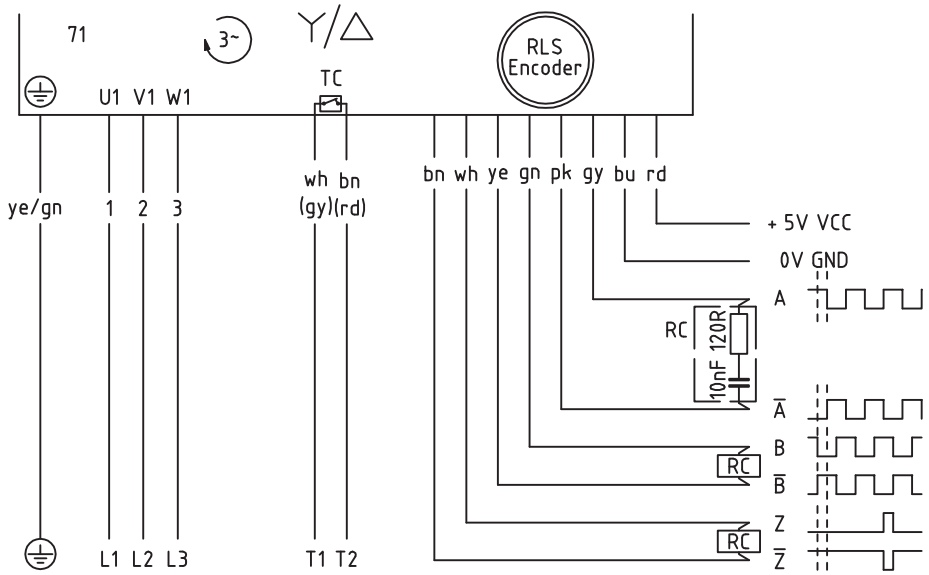
i = Gear ratio of drum motor

Technical data

	RS422A 5 V	Push-Pull 24 V
Motor size	80i[1] ... 216i	80i[1] ... 216i
Supply voltage	5 V ± 5 %	8 - 26 V
Supply current	35 mA	50 mA at 24 V
Resolution p (pulses per revolution)	1024, 512[2]	1024, 512[2]
Output Signal (RS422A)	A/$\overline{A}$, B/ $\overline{B}$, Z/$\overline{Z}$	A/$\overline{A}$, B/ $\overline{B}$, Z/$\overline{Z}$
Max. cable length	50 m	20 m
Accuracy[3]	± 0.5 °	± 0.5 °
Hysteresis	0.18 °	0.18 °

[1] On 80i only available with a special shaft diameter of 25 mm.
[2] Other resolutions available on request, please consult Interroll.
[3] Worst case within operational parameters including magnet position and temperature.

Connections

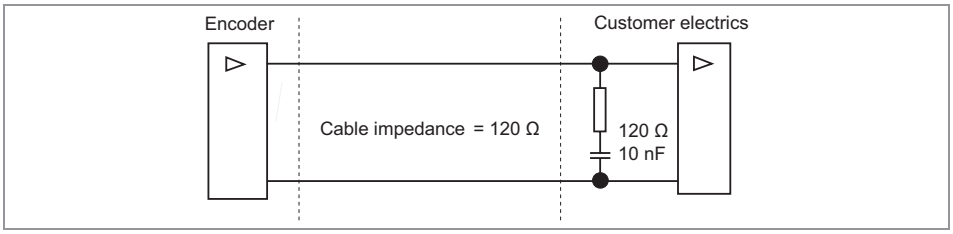


3-phase operation, 4+2 and 8 lead cable, winding for 1 voltage, delta or star connection (internally connected)

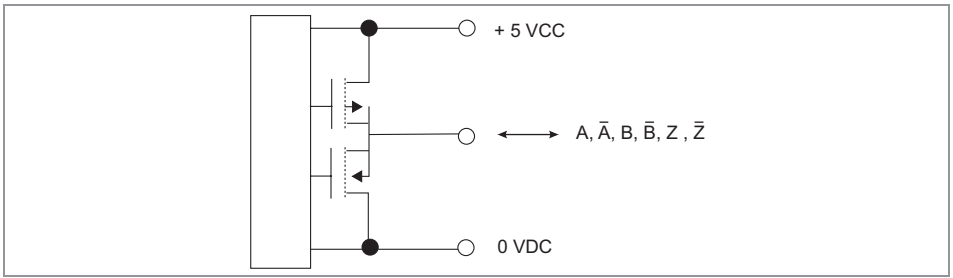
The termination with resistor and capacitor (RC) can reduce noise.

The signal sequence of A and B depends on the gear ratio of the drum motor. Therefore the rotation direction can be different for drum motors with the same number of poles and power but different speed. In this case the signal cables A and B can be interchanged.

Signal termination



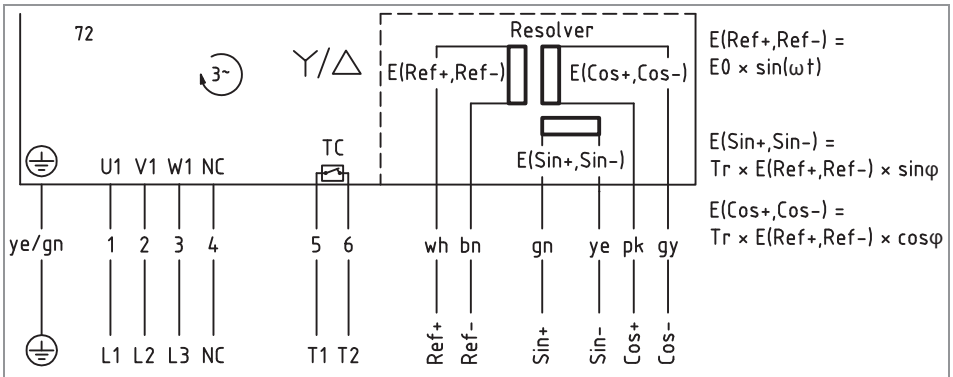
Incremental RS422A, Push-Pull



Resolver type RE-15-1-LTN

A resolver is an inductive running, robust feedback system. It is integrated in the Drum Motor and mainly used in servo systems.

Connections



3-phase operation 7+6 lead cable, winding for 1 voltage delta or star connection (internally connected), with resolver

External wire color	White	Brown	Pink	Grey	Green	Yellow
Signal	Ref+	Ref-	Cos+	Cos-	Sin+	Sin-

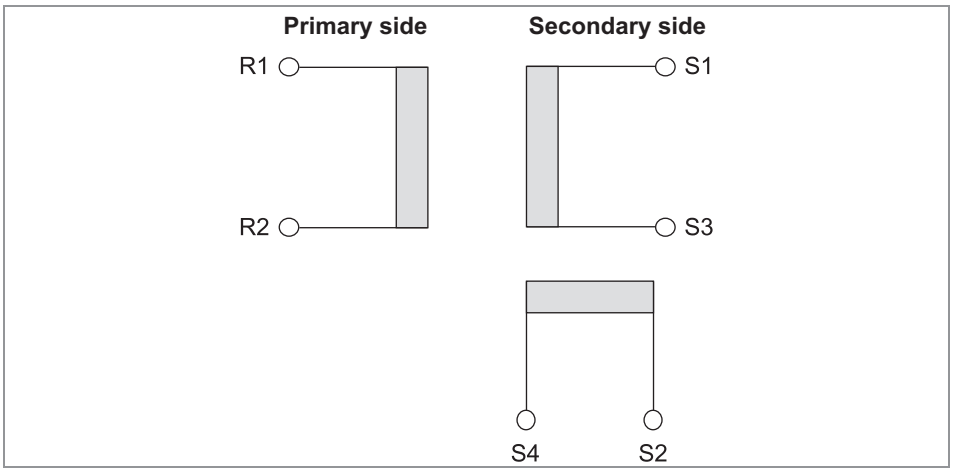
Connection	Ref+ to Ref-	Cos+ to Cos-	Sin+ to Sin-
Resistance	40 Ω	102 Ω	102 Ω

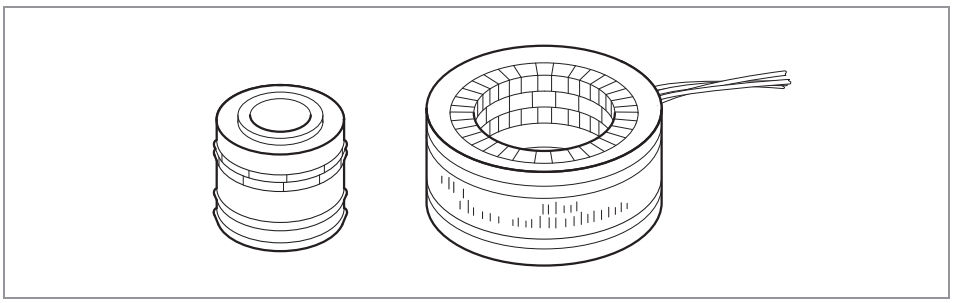
Technical data

Input frequency	**5 kHz**	**10 kHz**
Input voltage	7 V_{rms}	
Input current	58 mA	36 mA
Phase shift (± 3°)	8°	-6°
Null voltage	max. 30 mV	
Accuracy	± 10', ± 6' on request	
Accuracy ripple	max. 1'	
Operating temperature	-55 °C to +155 °C	
Max. permissible speed	20 000 rpm	
Weight Rotor	25 g	
Weight Stator	60 g	
Rotor moment of inertia	0.02 kgcm²	
Hi-pot Housing/Winding	min. 500 V	
Hi-pot Winding/Winding	min. 250 V	
Length of stator	16.1 mm	

Impedance

Input frequency	5 kHz	10 kHz
Z_{ro} in Ω	75j98	110j159
Z_{rs} in Ω	70j85	96j150
Z_{so} in Ω	180j230	245j400
Z_{ss} in Ω	170j200	216j370





Encoder input unit handling information for encoder type BMB-6202-SKF

An NPN encoder ideally should be connected to an interface that:

- can be set to work on NPN signal level
- has an integrated load resistor R_L

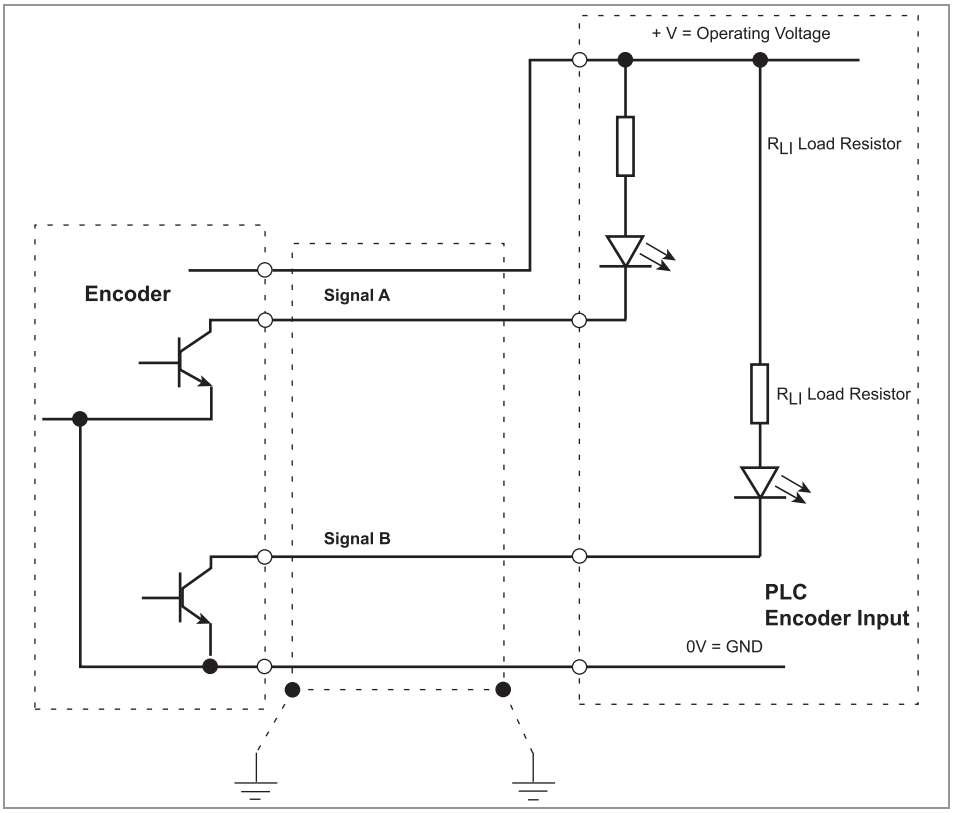
The internal load resistor R_L must be specified to enable a load current for the encoder and the encoder unit to operate trouble-free. If there is a need to connect the encoder to a PNP input unit, we recommend in this case to use a signal transformer. (For example “Electronic Terminal Block with Optocoupler“, see figure below). Otherwise the encoder could be damaged by overload or the system signal/noise ratio will be reduced.

If you are in doubt, please contact your PLC/DRIVER partners. They will give you assistance and they can select the correct input unit that should be used.

Best connection

Best connection of a NPN open-collector output encoder to an input unit

Condition: R_L must be dimensioned to ensure the specified encoder output current range.



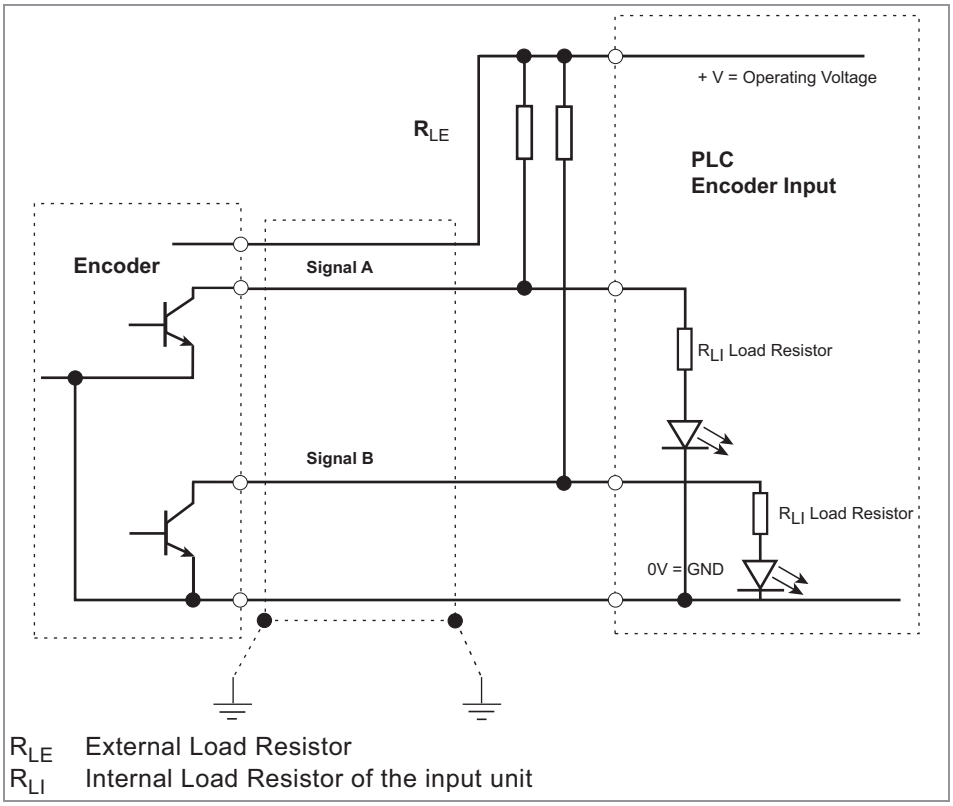
- If procurable, connect the encoder to an interface as shown above.
  The integrated load Resistor R_L mostly is dimensioned to ensure a load current range up to 15 mA, so the encoder output will not be overloaded.
  The signal operating level of some input units can be selected by hardware or software to NPN or PNP. NPN is required in this case.
- If not procurable, use a signal coupler.
  Such a coupler works identically to the drawing shown above. See any examples that could be used as follows:

WAGO	Electronic Terminal with Optocoupler	Order No. 859-758
PHOENIX	Input Optocoupler	Type: DEK-OE-24DC/24DC/ 100KHz
WEIDMÜLLER	Optocoupler Waveseries	Type: WOS1 12-28VDC 100KHz

Worst case connection

Worst case connection of a NPN open-collector output encoder to a PNP input unit

Typical configuration for a PLC with inputs:
- High-Active
- PNP signal level



R_{LE} External Load Resistor
R_{LI} Internal Load Resistor of the input unit

The circuit shown above does not meet the signal level requirements under any circumstances. The causes are as follows:
- It is difficult to size the external load resistor to avoid overstressing the encoder output while at the same time ensuring a correct high voltage level at the input unit.
- This results in a significant decline in the signal-to-noise ratio.

The encoder should thus be connected to the (PLC) input as shown in the "Best connection" diagram (see above).

Transport and storage

Transport

⚠ CAUTION

Risk of injury due to improper transport

- Transport may only be carried out by qualified and authorized persons.
- For Drum Motors with diameters of 136 mm or above use a lifting rope or harness during transport. The working load capability of the lifting rope or harness must exceed the weight of the Drum Motor. They also must be securely attached onto the shafts when lifting.
- Do not stack pallets.
- Make sure that the Drum Motor is fixed properly before transport.

NOTICE

Risk of damages to the Drum Motor due to improper transport

- Avoid hard shocks during transport.
- Do not lift the Drum Motor by the cable or Terminal Box.
- Do not transfer the Drum Motors between warm and cold environments. This may cause water condensation.
- Ensure that the S-series Drum Motors which are manufactured for vertical mounting are transported in horizontal position.

- Check each Drum Motor for damage after transport.
- In case of damage, take photos of the damaged parts.
- Report any damage caused by transport immediately to the transport company and Interroll, to maintain warranty.

Storage

⚠ CAUTION

Risk of injury due to improper storage

- Do not stack pallets.
- Do not stack more than four carton boxes.
- Ensure proper fixing.

- Store the Drum Motor in a clean, dry and enclosed area between +15 and +30 °C and protect it from wet and damp.
- For storage periods of more than three months rotate the shaft periodically to prevent deterioration of the shaft seals.
- Check each Drum Motor for damage after storage.

Installation

Warning notices concerning installation

⚠ CAUTION

Rotating parts and accidental motor start-ups
Risk of pinched fingers

- ➢ Do not insert fingers between the Drum Motor and any sort of belt or roller chain.
- ➢ Install a protection device (such as a guard plate) to prevent fingers from getting trapped in any sort of belt or roller chain.
- ➢ Attach an appropriate warning notice on the conveyor.

NOTICE

Risk of damage leading to failure or shortened life expectancy of the Drum Motor

- ➢ Observe the following notices.

- ➢ Do not drop or mishandle the Drum Motor to prevent internal damage.
- ➢ Check each Drum Motor for damage before installation.
- ➢ Do not hold, carry or support the Drum Motor by the cables or wires extending out of the mounting shaft to prevent damage to the internal solder joints and sealings.
- ➢ Do not twist the motor cable.
- ➢ Do not overtension the belt.

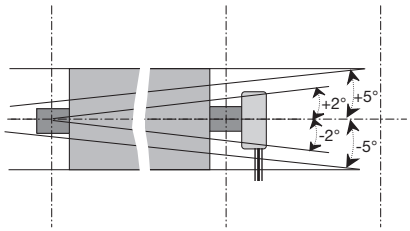
Mounting the Drum Motor

Positioning the Drum Motor

- ➢ Ensure that the data label information is correct and meets the specification that has been ordered and confirmed.

For non-horizontal Drum Motor applications a special design is required. The design must be specified at time of order.
Contact Interroll if in doubt.

The Drum Motor has to be mounted horizontally within +/- 5° (Drum Motor 113s: +/- 2°) unless otherwise indicated in the order confirmation.



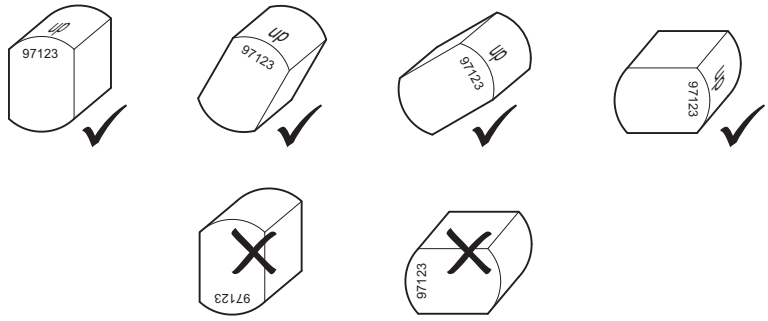
Drum Motor position

All Drum Motors are stamped at one shaft end with the serial number and in some cases with the letters UP.

NOTICE

Risk of damage to the motor due to wrong mounting orientation

- Ensure that the serial number and/or the UP mark is situated according to the following installation diagram. Models 80S, 113S, and D-series can be mounted in any orientation.



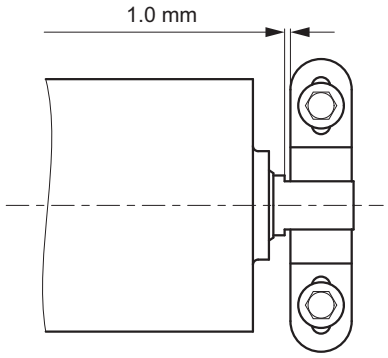
Mounting orientation

Mounting the Drum Motor with mounting brackets

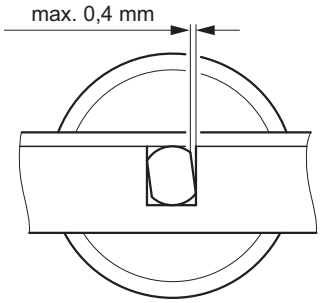
The mounting brackets must be strong enough to withstand the torque produced by the motor.

- Fix the mounting brackets securely to the conveyor or machine frame. Ensure that the Drum Motor is fitted parallel to the idler pulley and at right angles to the conveyor frame.
- Insert the shaft ends of the Drum Motor into the mounting bracket according to the diagram "Mounting orientation" (see above).
- If it is necessary to fix the shaft to the mounting brackets, fix it only on one side so that the opposite side allows axial movement for thermal expansion. Torque fixing for S-, D-series, 80i, 113i, 217i and 315i: fix non-cable side Torque fixing for 138i, 165i, 216i and 113E: fix cable side
- Ensure that at least 80 % of the Drum Motor shaft flat lengths are supported by the mounting bracket.
- Ensure that the clearance between the flats and the mounting bracket is not more than 0.4 mm.
- If the Drum Motor will be used with frequent reversible operations or many start/stops: Ensure that there is no clearance between the flats and the mounting bracket.

It is also possible to mount the Drum Motor without mounting brackets. In this case, the shaft ends have to be fitted into cut-outs that are cut into the conveyor frame and reinforced to fulfill the above requirements.



Axial play

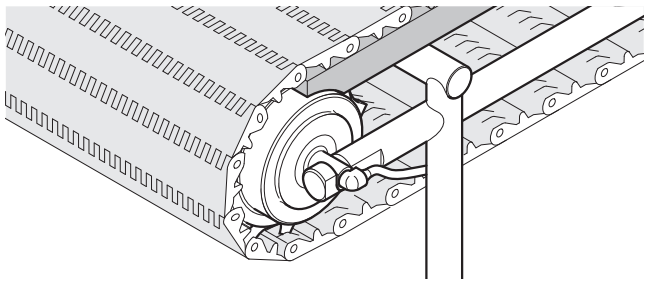


Torsion play

- If necessary, fix a retaining plate over the mounting bracket to secure the Drum Motor's shaft. However ensure that the shaft can move axially on one side to allow for thermal expansion.

Hygienic installation

- Ensure an open and easy accessible mounting which facilitates cleaning and inspection.



Hygienic installation

- To fulfill EHEDG recommendations, ensure that there is no metal-to-metal contact between the motor shaft and the conveyor frame, for example by using a rubber sealing between shaft and frame. The rubber shall be USDA/ FDA and EC 1935/2004 compliant.

Mounting belt

Belt width/shell length

NOTICE

Risk of overheating due to small belt

➢ Ensure that the Drum Motor is fitted with a conveyor belt that covers at least 70 % of the Drum Motor face width (roller length).

Drum Motors having less than 70 % belt contact or fitted with a modular belt or without a belt may require a different design and must be specified at time of order. If in doubt, contact Interroll.

Belt alignment

Crowned shells help to centralise and guide the belt during normal operation. However, belt alignment should be made carefully, checked frequently during the initial start up phase and adjusted as necessary according to the load conditions.

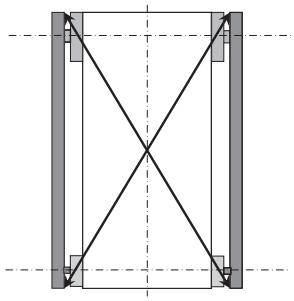
NOTICE

Risk of shortened life expectancy, damage of belt and bearing due to misalignment

➢ Align the Drum Motor, belt and idler pulleys following the instructions in this manual.

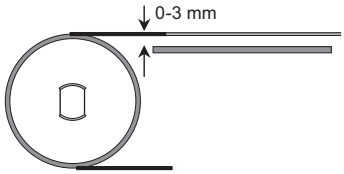
➢ Align the belt by using the return idler rollers, carrying rollers and/or when fitted, the bend pulleys or snub pulleys.

➢ Check the diagonal measurements (between the drum motor shafts and tail/ idler pulley shafts or belt edge to belt edge).
The maximum difference must not be more than 0.5 %.



Diagonal check

The gap between the belt and the slider bed plate should be not more than 3 mm.



Belt position

Tensioning the belt

The necessary belt tension depends on the application. Refer to the belt manufacturer's catalog or contact Interroll for advice.

NOTICE

Risk of shortened life expectancy, worn bearings and oil leakage due to overstretched belts.

- ➢ Do not tension the belt more than recommended by the belt manufacturer or than given in the product tables of the catalogue.
- ➢ When using a modular belt, a steel belt, a Teflon fiberglass belt, or a PU thermal moulded belt, no belt tension should be applied (refer to the belt manufacturers instructions).

- ➢ Adjust the belt tension by tightening or loosening the respective screws on both sides of the conveyor to ensure that the Drum Motor remains square to the conveyor frame and parallel to the tail / idler pulley.
- ➢ Tension the belt sufficiently only to drive the belt and its load.

Rubber lagging

Subsequently applied rubber lagging may cause overheating of the Drum Motor. For certain Drum Motors limitations to the thickness of lagging may apply.

To help to reduce thermal overload, the calculated required power should be multiplied by a factor of 1.2.

When applying rubber lagging, contact Interroll for the type and maximum thickness allowed.

Sprockets fitted to the shell

For modular belt operation a sufficient number sprockets must be fitted to the drum shell to support the belt and pull the load. Sprockets that engage the belt must be floating to ensure thermal expansion of the belt. One sprocket only may be fixed to guide the belt, alternatively the belt can be guided at the sides.

NOTICE

Risk of damage to the belt

- ➢ Do not use a fixed sprocket together with side guides.

Warning notices concerning the electrical installation

⚠ WARNING

Risk of electric shock

- Ensure that the electrical installation is only be executed by qualified and authorized persons.
- Disconnect the power supply before installing, removing or rewiring the Drum Motor.
- Always refer to the connection instructions and ensure that the motor power and control circuits are connected properly.

NOTICE

Risk of damage to the Drum Motor

- Do not apply DC supply to an AC Drum Motor or AC supply to a DC Drum Motor as this will cause irreparable damage.
- Do not connect D-series Drum Motors directly to the mains supply. Connect the D-series Drum Motors only to suitable VFD or servo drive controllers.

Electrical connection of the Drum Motor

Connecting Drum Motor - Cable option

- Ensure that the motor is connected to the correct voltage supply according to the motor data label.
- Ensure that a suitable earth connection is made to the Drum Motor cable lead colored green/yellow.
- Connect the Drum Motor according to the connection diagrams (see chapter "Connection Diagrams" of the respective series)

Connection Diagrams i-series: *see page 34*
Connection Diagrams S-series: *see page 49*
Connection Diagrams E-series: *see page 58*
Connection Diagrams D-series: *see page 67*

Connecting Drum Motor - Terminal Box option

NOTICE

Damage to the internal wiring due to modification of Terminal Box

- Do not dismantle, reassemble or modify the Terminal Box in any way.

- Remove the cover plate of the Terminal Box.
- Ensure that the motor is connected to the correct supply according to the motor data label.
- Ensure that a suitable earth connection is made to the Drum Motor Terminal Box earth connector.
- Connect the Drum Motor according to the connection diagrams (see chapter "Connection Diagrams" of the respective series).
- Reinstall the cover plate.

Single-phase motor

Single-phase Drum Motors should be connected to a starting capacitor and a running capacitor if 100 % starting torque is required. Without a starting capacitor, the starting torque may be as low as 70 % of the nominal torque listed in the Interroll catalog.

For connection of starting capacitors, refer to the connection diagrams (see chapter "Connection Diagrams" of the respective series).

External motor protection

The motor must always be installed together with a suitable external motor protection device, e. g. an overcurrent relay. The protection device must be set according to the rated current of the specific motor (see label).

Integral Thermal Control

⚠ CAUTION

Accidental motor starts. Risk of pinched fingers.

- ➢ Connect the Integral Thermal Control switch to an external control device which interrupts the motor power supply in case of overheating.
- ➢ Investigate and remedy the cause of the overheating prior to turning on the power supply again, when the Internal Thermal Control switch has been tripped.

The maximum switching current of the thermal switch is 2.5 A as standard. For other options please contact Interroll.

Frequency converter

Asynchronous Drum Motors can be operated with frequency converters. Frequency converters from Interroll are already set (when specified) to the parameters suitable for the respective Drum Motor.

- ➢ If you don't use an Interroll frequency converter, set up the frequency converter using the correct parameters according to the motor data.
- ➢ Do not allow resonant frequencies in the power line to cause voltage spikes in the motor.
  Frequency converters create resonant frequencies in the cable between the frequency converter and the motor if the cable is too long.
- ➢ Use a fully screened cable to connect the frequency converter to the motor.
- ➢ If the cable is longer than 10 m or if one frequency converter controls more than one motor install a motor sine filter or a motor inductor.
- ➢ Ensure, that the cable screen is connected to ground earth, according to electrical engineering rules and to local EMC recommandations.

Backstop (one-way rotor bearing)

NOTICE

Damage of the Drum Motor with Backstop option due to incorrect connection of rotation direction.

- ➢ Connect the motor according to the connection diagrams (see chapter "Connection Diagrams" of the respective series). The correct direction is indicated by an arrow positioned on the end housing on the electrical connection side of the Drum Motor.

Electromagnetic Brake

An electromagnetic brake fitted to the Drum Motor will be supplied with a DC rectifier (unless a 24 VDC brake is supplied). The rectifier and brake must be connected according to the connection diagrams (see chapter "Connection Diagrams" of the respective series).

The rectifier has an input for AC-voltage and an output for DC-voltage to the brake coil.

NOTICE

Damage to the Drum Motor and brake if both are operating at the same time.

- Design control circuits so that the motor and the brake never work against each other.
- Keep in mind, that depending on temperature and oil viscosity there can be a reaction time up to 0.4 - 0.6 seconds to engage and release the brake.
- Do not engage the brake before power to the motor has been switched off.
- Do not start the motor until the brake has been released.

Cable length should be as short as possible and must have a wire cross section according to national/international regulations so that the voltage supply at the rectifier differs not more than ±2 % from the correct nominal voltage.

If the Drum Motor with Electromagnetic Brake option is used in an ambient temperature less than +10 °C, special oil is required. Contact Interroll if in doubt.

NOTICE

Damage of the Drum Motor due to transience, radio or other electrical interferences

- Position the rectifier within 2 meters of the brake.
- Screen the cable length separately for both AC and DC supply voltages.
- Do not connect the rectifier to the motor star point when the brake is used for a declined conveyor. This can cause generated power overload to the rectifier and brake windings.

Initial startup and operation

Initial start up

Do not operate the Drum Motor before the motor is correctly installed and connected to the power supply, with all rotating parts protected or guarded by the original equipment.

Inspections before initial startup

The Drum Motor is supplied factory-filled with the correct amount of oil and is ready for installation. However, before the initial startup of the motor the following procedures must be carried out:

- Ensure that the motor data label matches the specification ordered.
- Ensure that no objects are in contact with rotating or moving parts.
- Ensure that the Drum Motor and the conveyor belt are free to move.
- Ensure that the belt is tensioned correctly according to the Interrolls recommendations.
- Ensure that all bolts are tightened according to the specifications.
- Ensure that no additional dangerous areas arise due to interfaces with other components.
- Ensure that the Drum Motor is wired correctly and connected to the correct supply voltage.
- Check all safety devices.
- Ensure that no bystanders are in dangerous areas around the conveyor.

Operation

⚠ CAUTION

Rotating parts and accidental starts
Risk of pinched fingers

- ➢ Do not insert fingers between the Drum Motor and the belt.
- ➢ Do not remove the protection device.
- ➢ Keep fingers, hair and loose clothing away from the Drum Motor and the belt.

Precise speed requirements
If exact speeds are required, the use of a frequency converter and/or the Encoder solution may be required.
The given nominal motor speeds can deviate by ± 10 %. The belt speed specified on the label is the calculated speed on the shell diameter under full load at nominal voltage.

If using a reversible conveyor:
A time delay between forward and reverse function is required.
The motor must come to a complete stop before reversing.

Inspections before every startup

- ➢ Check the Drum Motor for visible damage.
- ➢ Ensure that no objects are in contact with rotating or moving parts.
- ➢ Ensure that the Drum Motor and the conveyor belt are free to move.
- ➢ Check all safety devices.
- ➢ Ensure that no bystanders are in dangerous areas around the conveyor.
- ➢ Clearly specify and monitor the way goods are placed on the conveyor.

Procedure in case of accident or malfunction

- ➢ Stop the conveyor at once and ensure that it cannot be started accidentally.
- ➢ In case of an accident: Provide first aid and call for emergency assistance.
- ➢ Inform responsible persons.
- ➢ Have the malfunction repaired by qualified persons.
- ➢ Start the conveyor only after this has been approved by qualified persons.

Maintenance and cleaning

Warning notices concerning maintenance and cleaning

⚠ CAUTION

Risk of injury due to improper handling or accidental motor starts

- Maintenance work and cleaning may only be executed by qualified and authorized persons.
- Only perform maintenance work after switching off the power. Ensure that the Drum Motor cannot be turned on accidentally.
- Set up signs indicating maintenance work.

Preparation for maintenance and hand cleaning

- Switch off the power supply of the Drum Motor.
- Turn off the main power supply switch to disconnect the Drum Motor.
- Open the Terminal Box and disconnect the cables.
- Put up a sign at the control box signalizing the maintenance work.

Maintenance

In general Interroll Drum Motors are maintenance-free and require no specific attention during their normal operational lifetime. Nevertheless some inspections should be done at periodical intervals:

Checking the Drum Motor

- Each day, ensure that the Drum Motor is free to rotate without encumbrance.
- Each day, check the Drum Motor for visible damage.
- Each day, check that the belt is aligned correctly and runs central to the drum motor and parallel with the conveyor frame. Adjust the alignment if necessary.
- Once per week, ensure that the drum motor shaft and brackets are secured properly to the conveyor frame.
- Once per week, ensure that cables, leads and connections are in good condition and fixed securely.

Re-greasing the Drum Motor

Some Drum Motors are equipped with re-greasable nipples.

- If re-greasable nipples are supplied, top up as necessary with Shell Cassida grease RLS 2 food grade synthetic after every cleaning with hot water and high pressure. If the cleaning is only done with warm running water, regrease the Drum Motor once a week.

Maintaining Drum Motors with optional re-greasable IP66 seals

- Re-grease IP66 re-greasable seals regularly with anti-friction and/or food-grade grease in accordance with the operating and environmental conditions.
- Re-grease more frequently if installed in aggressive environments and continuous contact with water, salt, dust, etc. or where working under full load.

Replacing a Drum Motor

If a Drum Motor is damaged or broken, remove it before repair or replacement (*see "Abandonment", page 116* and *see "Mounting the Drum Motor", page 86*).

Changing the oil of the Drum Motor

It is not necessary to change the oil, but it may be done for special reasons.

⚠ WARNING

The oil can burn, cause slippery surface, and may contain harmful substances.
Risk of damages to the health and environment

- Do not swallow the oil. Ingestion may result in nausea, vomiting and/or diarrhoea. In general no treatment is necessary unless large quantities are swallowed. However, get medical advice.
- Avoid contact with skin and eyes. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
- If oil is spilt, use appropriate containment to avoid environmental contamination and clean the contaminated area as soon as possible to avoid slippery surfaces. Properly dispose of any contaminated rags or cleaning materials in order to prevent spontaneous combustion and or fire.
- If the oil burns, use foam, water spray or fog, dry chemical powder, or carbon dioxide to extinguish a fire. Do not use water in a jet. Wear proper protective equipment including breathing apparatus.

NOTICE

Damage to the motor due to use of wrong oil type

- When changing the oil, refer to the motor data label or the list of oil types (*see "List of oil types", page 98*).
- Do not use oils containing additives which may damage the motor insulation or seals.
- Do not use oils containing graphite, molybdenum disulphite or other electrically conductive based oils.

- Remove the oil plugs and clean any metal particels from the magnetic oil plug when fitted.
- Drain the oil from the Drum Motor and dispose of it according to the recommendations (*see "Disposal", page 116*).
- Fill the Drum Motor with new oil (type and volume see following tables).
- Insert and tighten the oil plugs on the Drum Motor.

List of oil types

Drum motor	Oil type	Ambient temperature °C	Viscosity	Reference number
80S	Mineral	+10 to +40	ISO VG 68	OL0168
	Food-grade, synthetic	+10 to +40	ISO VG 68	OL0002
	Low temperature, food-grade, synthetic	-25 to +20	ISO VG 15	OL0215
113S	Mineral	0 to +40	ISO VG 32	OL0132
	Food-grade, synthetic	0 to +40	ISO VG 32	OL0232
	Low temperature, food-grade, synthetic	-25 to +20	ISO VG 15	OL0215
80i	Mineral	+5 to +40	ISO VG 100	OL0003
	Food-grade, synthetic	-20 to +40	ISO VG 68	OL0002
80i with brake	Food-grade, synthetic	-10 to +40	ISO VG 68	OL0002
113i to 217i	Mineral	+5 to +40	ISO VG 100	OL0003
	Food-grade, synthetic	-25 to +40	ISO VG 150	OL0001
315i	Food-grade, synthetic	-25 to +40	ISO VG 150	OL0001
113i to 216i with brake	Mineral	+10 to +40	ISO VG 100	OL0003
	Food-grade, synthetic	+10 to +40	ISO VG 150	OL0001
	Low temperature, food-grade, synthetic	-10 to +15	ISO VG 68	OL0002
113E	Mineral	+5 to +40	ISO VG 100	OL0003
	Food-grade, synthetic	-25 to +40	ISO VG 150	OL0001
SN062D	Mineral	+5 to +40	ISO VG 100	OL0003
	Food-grade, synthetic	-25 to +40	ISO VG 150	OL0001
SN062D with brake	Food-grade, synthetic	-10 to +40	ISO VG 68	OL0002

Food-grade oil is FDA and USDA approved. The ISO viscosity classes are according to ISO 3498-1979.

Oil contents for S-, i-, and E-series in litres (normal installation)

RL/SL mm	80S	113S	80i	113i*	138i*	165i*	216i*	217i	315i	113E
200			0.12							
250			0.14	0.40						
262		0.42								
270	0.17	0.44								
300	0.23	0.52	0.17	0.50 / 0.40	0.70					0.26
350	0.33	0.68	0.21	0.60 / 0.40	0.80 / 0.70					0.37
400	0.42	0.86	0.25	0.60 / 0.50	1.00 / 0.80	1.20	3.10			0.48
450	0.52	0.98	0.29	0.70 / 0.60	1.10 / 1.00	1.40 / 1.20	3.30 / 3.10	2.0		0.59
500	0.61	1.10	0.32	0.80 / 0.70	1.30 / 1.10	1.60 / 1.40	3.70 / 3.30	2.1	6.8	0.70
550	0.71	1.22	0.36	0.90 / 0.80	1.40 / 1.30	1.80 / 1.60	4.10 / 3.70	2.3	7.6	0.81
600	0.80	1.34	0.40	1.00 / 0.90	1.60 / 1.40	1.90 / 1.80	4.50 / 4.10	2.6	8.3	0.92
650	0.90	1.46	0.44	1.10 / 1.00	1.70 / 1.60	2.10 / 2.00	4.90 / 4.50	2.9	9.1	1.03
700	0.99	1.58	0.48	1.20 / 1.10	1.90 / 1.70	2.30 / 2.10	5.30 / 4.90	3.1	9.8	1.14
750	1.09	1.70	0.51	1.30 / 1.20	2.00 / 1.90	2.50 / 2.30	5.70 / 5.30	3.4	10.6	1.25
800	1.20	1.82	0.55	1.40 / 1.30	2.20 / 2.00	2.70 / 2.50	6.10 / 5.70	3.6	11.3	1.36
850	1.28	1.94	0.59	1.50 / 1.40	2.30 / 2.20	2.90 / 2.70	6.50 / 6.10	3.9	12.1	1.47
900	1.37	2.06	0.63	1.60 / 1.50	2.50 / 2.30	3.10 / 2.90	6.90 / 6.50	4.1	12.8	1.58
950	1.47	2.18	0.67	1.70 / 1.60	2.60 / 2.40	3.30 / 3.10	7.30 / 6.90	4.4	13.6	1.69
1000		2.30	0.70	1.80 / 1.70	2.70 / 2.60	3.50 / 3.30	7.70 / 7.30	4.7	14.3	1.80
1050		2.42		1.90 / 1.80	2.90 / 2.70	3.70 / 3.50	8.10 / 7.70	4.9	15.1	1.91
1100		2.54		2.00 / 1.90	3.00 / 2.90	3.80 / 3.70	8.50 / 8.10	5.2	15.8	2.02
1150				2.10 / 2.00	3.20 / 3.00	4.00 / 3.90	8.90 / 8.50	5.4	16.6	
1200				2.20 / 2.10	3.30 / 3.20	4.20 / 4.00	9.30 / 8.90	5.7	17.3	
1250				2.30 / 2.20	3.50 / 3.30	4.40 / 4.20	9.70 / 9.30	6.0	18.1	
1300				2.40 / 2.30	3.60 / 3.50	4.60 / 4.40	10.10 / 9.70	6.2	18.8	
1350				2.50 / 2.40	3.80 / 3.60	4.80 / 4.60	10.50 / 10.10	6.5	19.6	
1400				2.60 / 2.50	3.90 / 3.80	5.00 / 4.80	10.90 / 10.50	6.7	20.3	
1450				2.70 / 2.60	4.10 / 3.90	5.20 / 5.00	11.30 / 10.90	7.0	21.1	
1500				2.80 / 2.70	4.20 / 4.10	5.40 / 5.20	11.70 / 11.30	7.2	21.8	
1550				2.90 / 2.80	4.40 / 4.20	5.60 / 5.40	12.10 / 11.70	7.5	22.6	
1600				3.00 / 2.90	4.50 / 4.40	5.70 / 5.60	12.50 / 12.10	7.8	23.3	
1650									24.1	
1700									24.8	
1750									25.5	

RL/SL = Shell length

* = Standard version / High Power version

Oil contents for S-, i-, and E-series (vertical mounting)

Type	Litres	Electrical connection	Construction
80s	0.32	At the top	Standard
113s	1.00	At the top	Special Construction
80i	0.20	At the top	Special Construction
113i	0.60	At the top	Special Construction
138i	2.00	At the top	Special Construction
165i	3.00	At the top	Special Construction
216i	5.00	At the top	Special Construction
113E	*see page 99*	At the bottom	Special Construction

Oil contents for D-series

SN062D-082 standard

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**
SL (mm)	**Oil content (l)**							
200	0.16	0.13						
250	0.26	0.23	0.20	0.21	0.17		0.16	
300	0.37	0.33	0.31	0.31	0.28	0.25	0.26	0.22
350	0.47	0.44	0.41	0.41	0.38	0.35	0.36	0.33
400	0.57	0.54	0.51	0.51	0.48	0.45	0.46	0.43
450	0.67	0.64	0.61	0.61	0.58	0.55	0.56	0.53
500	0.77	0.74	0.71	0.71	0.68	0.65	0.66	0.63
550	0.87	0.84	0.81	0.81	0.78	0.75	0.77	0.74
600	0.97	0.94	0.91	0.91	0.88	0.85	0.87	0.84
650	1.07	1.04	1.01	1.02	0.98	0.96	0.97	0.94
700	1.18	1.14	1.12	1.12	1.08	1.06	1.07	1.04
750	1.28	1.24	1.22	1.22	1.19	1.16	1.17	1.14
800	1.38	1.35	1.31	1.32	1.29	1.26	1.27	1.24
850	1.48	1.44	1.42	1.42	1.39	1.36	1.37	1.34
900	1.58	1.55	1.52	1.52	1.49	1.46	1.47	1.44

SN062D-082 with brake

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	1	2	3	1	2	3	1	2
SL (mm)	Oil content (l)							
250	0.21	0.18						
300	0.31	0.28	0.27	0.25	0.22		0.21	
350	0.41	0.38	0.37	0.35	0.32	0.3	0.31	0.28
400	0.51	0.48	0.47	0.46	0.42	0.4	0.41	0.38
450	0.62	0.58	0.57	0.56	0.52	0.5	0.51	0.48
500	0.72	0.68	0.68	0.66	0.63	0.6	0.61	0.58
550	0.82	0.78	0.78	0.76	0.73	0.7	0.71	0.68
600	0.92	0.89	0.88	0.86	0.83	0.8	0.81	0.78
650	1.02	0.99	0.98	0.96	0.93	0.90	0.92	0.88
700	1.12	1.09	1.08	1.06	1.03	1.00	1.02	0.99
750	1.22	1.19	1.18	1.16	1.13	1.10	1.12	1.08
800	1.32	1.29	1.27	1.26	1.23	1.20	1.22	1.19
850	1.42	1.39	1.38	1.37	1.33	1.31	1.32	1.29
900	1.52	1.49	1.48	1.47	1.44	1.41	1.42	1.39

SN062D-082 with feedbacksystems (RLS/SKF/Resolver)

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	1	2	3	1	2	3	1	2
SL (mm)	Oil content (l)							
250	0.23	0.2						
300	0.33	0.3	0.29	0.27	0.24		0.23	
350	0.43	0.40	0.39	0.37	0.34	0.32	0.33	0.3
400	0.53	0.50	0.49	0.48	0.44	0.42	0.43	0.4
450	0.64	0.60	0.59	0.58	0.54	0.52	0.53	0.5
500	0.74	0.70	0.7	0.68	0.65	0.62	0.63	0.6
550	0.84	0.80	0.8	0.78	0.75	0.72	0.73	0.70
600	0.94	0.91	0.9	0.88	0.85	0.82	0.83	0.80
650	1.04	1.01	1	0.98	0.95	0.92	0.94	0.90
700	1.14	1.11	1.1	1.08	1.05	1.02	1.04	1.01
750	1.24	1.21	1.20	1.18	1.15	1.12	1.14	1.10
800	1.34	1.31	1.29	1.28	1.25	1.22	1.24	1.21
850	1.44	1.41	1.40	1.39	1.35	1.33	1.34	1.31
900	1.54	1.51	1.50	1.49	1.46	1.43	1.44	1.41

SN062D-102 standard

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	1	2	3	1	2	3	1	2
SL (mm)	Oil content (l)							
200	0.32	0.29						
250	0.47	0.43	0.41	0.41	0.38	0.35		
300	0.61	0.58	0.55	0.55	0.52	0.49	0.50	0.47
350	0.75	0.72	0.69	0.69	0.66	0.63	0.64	0.61
400	0.89	0.86	0.83	0.83	0.80	0.77	0.79	0.75
450	1.03	1.00	0.97	0.98	0.94	0.91	0.93	0.9
500	1.18	1.14	1.12	1.12	1.09	1.06	1.07	1.04
550	1.32	1.29	1.26	1.26	1.23	1.2	1.21	1.18
600	1.46	1.43	1.4	1.40	1.37	1.34	1.35	1.32
650	1.60	1.57	1.54	1.54	1.51	1.48	1.5	1.46
700	1.74	1.71	1.68	1.68	1.65	1.62	1.64	1.60
750	1.89	1.85	1.83	1.83	1.8	1.77	1.78	1.75
800	2.03	2	1.97	1.97	1.94	1.91	1.92	1.89
850	2.17	2.14	2.11	2.11	2.08	2.05	2.06	2.03
900	2.31	2.28	2.25	2.25	2.22	2.19	2.21	2.17

SN062D-102 with brake

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	1	2	3	1	2	3	1	2
SL (mm)	Oil content (l)							
250	0.41	0.38						
300	0.55	0.52	0.49	0.5	0.46			
350	0.7	0.66	0.64	0.64	0.61	0.58	0.59	0.56
400	0.84	0.81	0.78	0.78	0.75	0.72	0.73	0.7
450	0.98	0.95	0.92	0.92	0.89	0.86	0.87	0.84
500	1.12	1.09	1.06	1.06	1.03	1.00	1.02	0.98
550	1.26	1.23	1.20	1.20	1.17	1.14	1.16	1.12
600	1.41	1.37	1.35	1.35	1.32	1.29	1.3	1.27
650	1.55	1.52	1.49	1.49	1.46	1.43	1.44	1.41
700	1.69	1.66	1.63	1.63	1.6	1.57	1.58	1.55
750	1.83	1.8	1.77	1.77	1.74	1.71	1.73	1.69
800	1.97	1.94	1.91	1.92	1.88	1.85	1.87	1.84
850	2.12	2.08	2.06	2.06	2.03	2	2.01	1.98
900	2.26	2.23	2.2	2.2	2.17	2.14	2.15	2.12

SN062D-102 with feedbacksystems (RLS/SKF/Resolver)

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	1	2	3	1	2	3	1	2
SL (mm)	Oil content (l)							
250	0.43	0.4						
300	0.57	0.54	0.51	0.52	0.48			
350	0.72	0.68	0.66	0.66	0.63	0.6	0.61	0.58
400	0.86	0.83	0.8	0.8	0.77	0.74	0.75	0.72
450	1	0.97	0.94	0.94	0.91	0.88	0.89	0.86
500	1.14	1.11	1.08	1.08	1.05	1.02	1.04	1.00
550	1.28	1.25	1.22	1.22	1.19	1.16	1.18	1.14
600	1.43	1.39	1.37	1.37	1.34	1.31	1.32	1.29
650	1.57	1.54	1.51	1.51	1.48	1.45	1.46	1.43
700	1.71	1.68	1.65	1.65	1.62	1.59	1.60	1.57
750	1.85	1.82	1.79	1.79	1.76	1.73	1.75	1.71
800	1.99	1.96	1.93	1.94	1.90	1.87	1.89	1.86
850	2.14	2.10	2.08	2.08	2.05	2.02	2.03	2
900	2.28	2.25	2.22	2.22	2.19	2.16	2.17	2.14

SN062D-113 standard

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	1	2	3	1	2	3	1	2
SL (mm)	Oil content (l)							
250	0.68	0.64	0.62					
300	0.88	0.85	0.82	0.82	0.79	0.76	0.77	0.74
350	1.08	1.05	1.02	1.02	0.99	0.96	0.98	0.94
400	1.28	1.25	1.22	1.22	1.19	1.16	1.18	1.15
450	1.49	1.45	1.42	1.43	1.4	1.37	1.38	1.35
500	1.69	1.66	1.63	1.63	1.6	1.57	1.58	1.55
550	1.89	1.86	1.83	1.83	1.8	1.77	1.78	1.75
600	2.10	2.06	2.03	2.03	2.00	1.97	1.99	1.95
650	2.3	2.26	2.23	2.23	2.20	2.18	2.19	2.16
700	2.50	2.46	2.44	2.44	2.40	2.38	2.39	2.36
750	2.71	2.66	2.64	2.64	2.61	2.58	2.59	2.56
800	2.91	2.87	2.84	2.84	2.81	2.78	2.79	2.76
850	3.11	3.07	3.04	3.04	3.01	2.98	3	2.96
900	3.32	3.27	3.24	3.24	3.21	3.18	3.2	3.17

SN062D-113 with brake

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	1	2	3	1	2	3	1	2
SL (mm)	Oil content (l)							
300	0.82	0.79	0.76					
350	1.03	1	0.97	0.97	0.94	0.91	0.92	0.89
400	1.23	1.2	1.17	1.17	1.14	1.11	1.12	1.09
450	1.43	1.4	1.37	1.37	1.34	1.31	1.33	1.29
500	1.64	1.60	1.57	1.57	1.54	1.52	1.53	1.5
550	1.84	1.80	1.78	1.78	1.74	1.72	1.73	1.7
600	2.04	2.00	1.98	1.98	1.95	1.92	1.93	1.9
650	2.25	2.21	2.18	2.18	2.15	2.12	2.13	2.10
700	2.45	2.41	2.38	2.38	2.35	2.32	2.34	2.30
750	2.65	2.61	2.58	2.58	2.55	2.52	2.54	2.51
800	2.86	2.81	2.78	2.79	2.76	2.73	2.74	2.71
850	3.06	3.02	2.99	2.99	2.96	2.93	2.94	2.91
900	3.26	3.22	3.19	3.19	3.16	3.13	3.14	3.11

SN062D-113 with feedbacksystems (RLS/SKF/Resolver)

Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W
Stages	1	2	3	1	2	3	1	2
SL (mm)	Oil content (l)							
300	0.84	0.81	0.78					
350	1.05	1.02	0.99	0.99	0.96	0.93	0.94	0.91
400	1.25	1.22	1.19	1.19	1.16	1.13	1.14	1.11
450	1.45	1.42	1.39	1.39	1.36	1.33	1.35	1.31
500	1.66	1.62	1.59	1.59	1.56	1.54	1.55	1.52
550	1.86	1.82	1.8	1.8	1.76	1.74	1.75	1.72
600	2.06	2.02	2	2	1.97	1.94	1.95	1.92
650	2.27	2.23	2.2	2.2	2.17	2.14	2.15	2.12
700	2.47	2.43	2.40	2.40	2.37	2.34	2.36	2.32
750	2.67	2.63	2.60	2.60	2.57	2.54	2.56	2.53
800	2.88	2.83	2.80	2.81	2.78	2.75	2.76	2.73
850	3.08	3.04	3.01	3.01	2.98	2.95	2.96	2.93
900	3.28	3.24	3.21	3.21	3.18	3.15	3.16	3.13

Cleaning

Material build up on the drum motor or on the underside of the belt will cause belt misalignment and possibly belt damage. Material build up between the belt and slide bed plate or rollers may also cause belt speed reduction and increase the power requirement. Periodic cleaning will ensure a high drive efficiency and good belt alignment.

- ➢ Remove foreign material from the drum.
- ➢ Do not use sharp-edged tools to clean the drum.

Cleaning the Drum Motor with a high pressure washer

Only stainless steel or rust free Drum Motors with IP66 or IP69k sealing can be cleaned with high-pressure washer.

NOTICE

Failure of seal due to high pressure

- ➢ Do not hold the nozzle in one position on the shaft seal in order to wash out the labyrinth or seal.
- ➢ Move the nozzle constantly equally over the complete Drum Motor.

Before cleaning with high-pressure, note the following:

- The distance between the high-pressure nozzle and the Drum Motor must be at least 30 cm.
- The maximum pressure that should be used is shown in the table below.
- High pressure washing should be carried out whilst the Drum Motor is running to prevent the possibility of ingress of water or damage to the seals.

The maximum cleaning temperature and pressure depends on the type of seal.

Type of sealing	Max. temperature	Max. water pressure	Remark
NBR IP66 sealing	80 °C	50 bar	all series for general use
FPM IP66 Viton sealing	80 °C	50 bar	For i-series wet and food applications
Re-greasable NBR IP66 sealing	60 °C	50 bar	For S- and E-series wet and food applications
PTFE IP69K sealing	80 °C	80 bar	For SN-series wet and food applications

Hygienic wash down

NOTICE

Risk of damage to the Drum Motor due to improper cleaning

- Never use an acid cleaning agent in combination with a chlorine-containing agent because dangerous chlorine gasses can develop, which can affect process equipment such as stainless steel and rubber parts.
- Do not use acid agents on aluminium or galvanised parts.
- Avoid temperatures above 55 °C to prevent proteins sticking to the surface.
  Remove fats with lower temperatures and proper cleaning agents.
- Avoid water pressure above 20 bar to prevent aerosol contamination.
- Allow 30 cm between the spray nozzle and cleaning surfaces.
- Do not point and hold the spray nozzle directly at labyrinths and seals.

- Wipe off and remove large and loose particles.
- Pre-clean with water (20 bar, 55 °C).
- Point the spray nozzle downwards towards the surface at an angle of 45°.
- For extra cleaning use a soft brush around seals, grooves and crevasses.
- In severe cases use a soft brush and/or plastic scraper in combination with the water spray.
- Clean with cold alkaline or acid agent for approximately 15 min.
- Wash off with water (20 bar, 55 °C).
- Disinfect with cold media for at least 10 min.
- Wash off with water (20 bar, 55 °C).
- Inspect surfaces, grooves and crevasses for residues after cleaning.

- If lime deposition takes place, an acid cleaning is advised 1 to 4 times a month.
- If the use of chlorine is approved, cleaning with an alkaline cleaning and disinfection agent is advised. In this case, depending on the degree of contamination, the final disinfection step can be skipped.

Troubleshooting

Error search

Symptom	Possible cause	Help
Motor does not start or stops during operation	No power supply	Check power supply.
	Incorrect connection or loose / broken cable connection	Check connection according to diagram. Check for broken cables / loose connections.
	Overheating of the motor	See symptom "Motor gets hot during normal operation".
	Motor overloaded	Disconnect main power supply and identify and remedy reason for overload.
	Internal thermal control tripped / failure	Check for overload / overheating. When cool, check continuity of internal thermal control. See symptom "Motor gets hot during normal operation".
	External overload protection tripped / failure	Check for overload / overheating. Check continuity and function of external overload protection.
	Motor winding phase failure	Replace Drum Motor or contact your local Interroll distributor for further help and advice.
	Motor winding short circuit (insulation failure)	Replace Drum Motor or contact your local Interroll distributor for further help and advice.
	Brake does not release	Check if brake operates at start up. Check connections and continuity of brake winding. If connections and brake winding are OK, check the rectifier.
	Back stop rotation incorrect (non-reversible-bearing)	Turn the power off immediately, rotate the drum by hand to determine if the fault is electrical or mechanical. Check the connection for correct rotation and, if necessary, change the phase connection so that the drum rotates in the right direction or, if possible, re-install the Drum Motor so that it operates in the opposite direction.
	Drum or conveyor belt is blocked	Make sure the belt and the Drum Motor are free from obstruction and that all rollers and drums rotate freely. If the Drum Motor cannot rotate freely, it might be a seize-up of transmission or bearing. In this case, contact your local Interroll distributor for advice.

Symptom	Possible cause	Help
Motor does not start or stops during operation	Low ambient temperature / high oil viscosity	Check if oil viscosity is suitable for the ambient temperature. If not, replace with oil having the correct specification. Install heating device or higher powered Drum Motor. In this case, contact your local Interroll distributor for further help and advice.
	Transmission or bearing seizure	Check by hand wether the drum can rotate freely. If not, replace Drum Motor or contact your local Interroll distributor for further help and advice.
Motor runs but drum does not rotate	Loss of transmission	Contact your local Interroll distributor for further help and advice.
Motor gets hot during normal operation	Overload of Drum Motor	Check nominal current for overload.
	Ambient temperature over 40 °C	Check ambient temperature. If too high, install cooling device. Contact your local Interroll distributor for further help and advice.
	Excessive or frequent stops/starts	Check if the number of stops/starts meets the Drum Motor's specifications and reduce frequency as necessary. Install frequency converter to optimize motor performance.
	Excessive belt tension	Check belt tension and reduce as necessary.
	Motor is not suitable for the application	Check if application meets the Drum Motor's specifications. Special de-rated motors are required when working with modular belts or without belts.
	Lagging too thick	Reduce lagging or contact your local Interroll distributor for further help and advice.
	Incorrect power supply	Check power supply. If in case of single phase: possibly wrong start capacitors or run capacitors installed.
	Incorrect frequency converter settings	Check if frequency converter settings meet the Drum Motor's specifications and revise.

Symptom	Possible cause	Help
Loud noises when the Drum Motor runs in normal operation	Incorrect frequency converter settings	Check if frequency converter settings meet the Drum Motor's specifications and revise.
	Loose mounting brackets	Check mounting brackets, shaft tolerances and fixing bolts.
	Belt overtensioned	Check belt tension and reduce as necessary.
	Faulty / incorrect profile between drum and belt	Make sure the belt and drum profiles match and are engaged properly. Replace if necessary.
	One phase of the power lead is not connected properly.	Check the cable connection and correct it if necessary.
Drum Motor runs with high vibration	Incorrect frequency converter settings	Check if frequency converter settings meet Drum Motor's specifications and revise.
	Loose mounting brackets	Check mounting brackets, shaft tolerances and fixing bolts
	Drum Motor out of balance	Check if specifications for Drum Motor include static or dynamic balancing and adjust.
Drum Motor runs intermittently	Drum Motor / belt is intermittently or partially blocked	Make sure the belt and Drum Motor are free from obstructions and that all rollers and drums rotate freely.
	Incorrect or loose power lead connection	Check connections.
	Damaged transmission	Check rotation by hand. Replace Drum Motor or contact your local Interroll distributor for further help and advice.
	Wrong or faulty power supply	Check power supply. If single phase, check capacitors.
Drum Motor / belt runs slower than specified	Incorrect motor speed ordered / supplied	Check Drum Motor specification and tolerances. Replace Drum Motor or contact your local Interroll distributor for further help and advice.
	Drum Motor / belt is intermittently or partially blocked	Make sure the belt and Drum Motor are free from obstruction and that all rollers and drums rotate freely.
	Incorrect frequency converter settings	Check if the frequency converter settings meet the Drum Motor's specifications and revise.
	Belt slipping	See symptom "Belt slipping on Drum Motor".

Symptom	Possible cause	Help
Drum Motor / belt runs slower than specified	Lagging slipping on drum shell	Check lagging condition and adhesion of lagging to shell. Replace lagging. Shot blast or roughen the shell surface to ensure good lagging adhesion.
	60 Hz motor installed in 50 Hz supply	Check motor specification and tolerances against supply voltage / frequency. Replace Drum Motor or contact your local Interroll distributor for further help and advice.
Drum Motor runs faster than specified	Incorrect motor speed ordered / supplied	Check Drum Motor specification and tolerances. Replace Drum Motor or contact your local Interroll distributor for further help and advice.
	Incorrect frequency converter settings	Check if frequency converter settings meet Drum Motor's specifications and revise.
	50 Hz motor installed in 60 Hz supply	Check if motor specification and tolerances meet supply voltage / frequency. Replace Drum Motor or contact your local Interroll distributor for further help and advice.
	Rubber lagging thickness has increased the belt speed over the nominal speed of the motor	Measure the thickness of rubber lagging and check if this was included and calculated when choosing the Drum Motor speed. Reduce the lagging thickness or install frequency converter or replace with Drum Motor having lower speed.
Motor winding - one phase failed	Winding isolation failure / overload	Check continuity, current and resistance on each phase winding. Replace Drum Motor or contact your local Interroll distributor for further help and advice.
Motor winding - two phases failed	Power supply failure on one phase causing overload on the other two phases / isolation failure	Check the supply to all phases. Check continuity, current and resistance on each phase winding. Replace Drum Motor or contact your local Interroll distributor for further help and advice.
Motor winding - all three phases failed	Motor overloaded / wrong supply connected	Check correct supply voltage. Check continuity, current and resistance on each phase winding. Replace Drum Motor or contact your local Interroll distributor for further help and advice.

Symptom	Possible cause	Help
Belt slipping on Drum Motor	Belt blocked	Make sure the belt and Drum Motor are free from obstruction and that all rollers and drums rotate freely.
	Insufficient friction between Drum Motor and belt	Check belt condition and tension, check drum shell or lagging condition and look for oil or grease between belt and Drum Motor.
	Excessive friction between belt and support / slide bed	Check underside of belt and slide bed for dirt / poor finish. Check for water infiltration between belt and slide bed which could cause suction and drag.
	Insufficient belt tension	Check belt condition and tension or shorten belt.
	Insufficient or wrong drum profile for modular belt	Make sure the belt and drum profiles / teeth are engaged properly. Make sure the height and tension of the belt are according to the belt manufacturer's specifications.
	Oil, grease or fat between belt and shell of Drum Motor	Remove excessive build up of oil, fat or grease. Make sure cleaning devices function correctly.
	Head / tail / transfer pulley diameters too small for belt	Check minimum drum diameter for belt. Knife edges / small diameter pulleys may cause excess friction and require more power.
	Lagging slipping on drum shell	Check lagging condition and adhesion of lagging to shell. Replace lagging. Shot blast or roughen the shell surface to ensure good lagging adhesion.
Belt jumping on Drum Motor	Belt blockage or material build-up on drums Poor or damaged belt joint Excess friction between belt and slide bed	Make sure the belt and drum are free from obstructions and that all rollers and drums rotate freely. Check belt joint.
	Conveyor belt loose or damaged	Check belt tension, condition of belt and lagging. Check belt tracking and alignment.
	Incorrect lagging / sprocket profile for modular belt	See symptom "Belt slipping on Drum Motor".

Symptom	Possible cause	Help
Belt misaligned / tracking off center	Material build-up on Drum Motor / pulleys / belt	Make sure the belt and drum are free from obstructions and that all rollers and drums rotate freely. Check belt joint.
	Material build-up on rollers	Check if material spillage occurs and that cleaning devices are functioning correctly.
	Faulty belt or badly joined belt	Check condition of belt and belt joint.
	Belt tension higher on one side	Make sure that the belt tension is equal on both sides.
	Top / bottom rollers out of alignment	Check alignment of carrying and return rollers.
	Head / tail / intermediate pulley out of alignment	Check alignment of Drum Motor and pulley.
	Conveyor frame out of alignment	Make sure conveyor frame is square, parallel and straight over its length.
	Load feeding from one side	Check force or friction at point of transfer.
	Belt profile not engaged with drum profile	Make sure the belt and drum profiles match and are engaged properly and not misaligned.
	Insufficient drum crowning for belt	Check belt / Drum Motor specifications.
Oil leakage around shaft seal	Shaft seals worn	Check for adverse abrasive or chemical conditions. Check operational life of seals.
	Shaft seals damaged	Make sure the seals are free from steel framework, material build up and other devices.
	Shaft bearings damaged / worn	Check the belt for excessive tension and loading. Check for water or chemical infiltration.
	Excess grease in labyrinth sealing	Check for oil or grease leakage. Oil remains fluid and grease will solidify when it is cold. Clean away excess grease. If symptom persists, contact your local Interroll distributor for help
Oil leakage around cable / Terminal Box	Loose cable connector gland Internal cable seal fault	Make sure the cable connector gland and seals are tight and not subject to excessive heat or chemicals.
	Loose connector gland Terminal box seal fault	Make sure the Terminal Box connector gland and seals are tight and not subject to excessive heat or chemicals.

Symptom	Possible cause	Help
Oil leakage around shell / end house	End housing loose in shell	Check for gaps between shell and end housings. Check for excessive belt tension or shock loading.
	End house / shell seal broken	Check for excessive heat or belt tension and shock loading.
Oil discoloration - Silver metallic particles	Gear teeth or bearing wear	Check condition of bearings and seals. Check for excessive load.
Oil discoloration - White color	Water or other fluid contamination	Check condition of seals and for water / fluid contamination. Replace oil (*see "It is not necessary to change the oil, but it may be done for special reasons.", page 97*).
Oil discoloration - Black color	Extreme working temperature Overloading No belt fitted	Check if the application / operating conditions meet the Drum Motor's specification. Check for current overload and high ambient temperature.
Cable / Terminal Box broken or damaged	Customer misuse or damage during installation	Check the nature of the damage and possible cause. Replace Terminal Box.
	Damaged in transit	Check the nature of the damage and possible cause. Replace Terminal Box.
Shaft bearings failure	Overload	Check if the application loading meets the Drum Motor's specifications.
	Shock loading	Check if application loading meets Drum Motor's specifications.
	Excessive belt tension	Check for excessive belt tension. Reduce as necessary.
	Lack of lubrication	Check the Drum Motor's oil level and installation. If vertically mounted, check Drum Motor motor specifications.
	Shaft stress or misalignment	Check for excessive screw tension and frame or mounting bracket misalignment.
	Shaft seal damaged / worn	Check for external contamination. Contact your local Interroll distrubutor.
	Loose or tight bearing journal fitting	Contact your local Interroll distrubutor.
Transmission failure	Overload / shock loading or normal wear and tear	Check if application loading meets the Drum Motor's specifications. Check lifespan.
Rotor bearings worn / failed	Lack of lubrication	Check correct type and level of oil.

Symptom	Possible cause	Help
Rotor pinion worn or broken teeth	Excessive frequent stops/starts, excessive start torque	Check if application meets Drum Motor's specifications. Check oil, maximum stops/starts and starting torque allowed.
Geared rim worn or broken teeth / bolts	Starting under excessive load and / or shock loading or blockage	Check if application and loading meets Drum Motor's specifications. Check for blockage.
Intermediate gears and bearings worn / failed	Lack of lubrication or worn gears or bearings	Check oil level. Check journal bearing fitting and pinion / shaft tolerances and lifespan.
Total or intermittent failure of brake and rectifier	Incorrect operating voltage connected	Make sure that the correct rectifier has been installed and the input voltage (V/ Ph/Hz) is correct.
	Incorrect connection	Make sure that the brake has been connected according to the connection diagram.
	Insufficient screening from external AC spikes from cables and external devices	Make sure that all cables between the brake, rectifier and supply are screened and earthed according to IEC recommendations.
Total or intermittent failure of brake and rectifier	Voltage drop due to excessive cable length	Check for voltage drop over long cables and make sure the cable cross section is sufficient according to IEC regulations.
	Excessive stops/starts	Make sure brake and rectifier specifications meet the application's requirements.
	Wrong rectifier connected	Contact Interroll for information on correct rectifier for brake and application.
	Overrun voltage generation / back feed when the rectifier is connected to motor star point	Decline conveyors may produce motor overrun and generate high voltage back feed if motor star point voltage is used.
	Brake windings short circuit	Check continuity of winding and rectifier.
Slow brake and rectifier response	Incorrect brake / rectifier chosen or specified	Make sure the brake and rectifier specifications meet the application's requirements.
	Low ambient temperature or oil viscosity too high	Make sure oil viscosity is suitable for the ambient temperature. If not, replace with oil having the correct specification. Install heating device or higher powered motor. In this case, contact your local Interroll distributor for further help and advice.

Symptom	Possible cause	Help
Encoder not functioning / intermittent function	Incorrect connection or loose / broken cable connection	Check connection diagram and check for broken cables and loose connections.
	Failure of electronic control back feed system	Trouble shooting should only be carried out by an qualified electrical engineering specialist.
	Encoder fault or failure	Trouble shooting should only be carried out by an qualified electrical engineering specialist.
	PC or driver fault	Trouble shooting should only be carried out by a qualified electrical engineering specialist.

Abandonment and disposal

Abandonment

⚠ CAUTION

Risk of injury due to improper handling

- Abandonment may only be executed by qualified and authorized persons.
- Only abandon the Drum Motor after switching off the power. Ensure that the Drum Motor cannot be turned on accidentally.

- Disconnect the motor cable from the supply voltage and control.
- Release the belt tension.
- Remove the retaining plate from the mounting bracket.
- Extract the Drum Motor from the conveyor frame.

Disposal

The operator is responsible for the proper disposal of the Drum Motor. In doing so, industry-specific and local provisions must be observed for the disposal of the Drum Motor and its packaging.

Appendix

Guarantee for Interroll Drum Motors

Interroll provides 2 years guarantee covering their range of Drum Motors against faulty workmanship and/or materials from the date of delivery or collection from their works. The guarantee period is based on normal operational use of the product for 8 hours per day, unless otherwise previously agreed in writing.

Subject to the terms of this guarantee, Interroll will repair or replace any faulty product free of charge that is returned to their factory within the guarantee period. Repairs carried out under guarantee period will not extend the guarantee.

Warranty restrictions

Interroll and their distributors accept no liability for failure or damage to the product due to:

- Failure to carry out Interroll's installation or maintenance instructions
- Failure to install a recognised motor protection device
- Failure to connect the Interroll internal thermal protection switch when fitted
- Reversing the drum motor before the motor has come to a complete standstill
- Use of the drum motor outside the specifications stated on the data plate and/or current Interroll catalogue or quotation
- Repairs, alterations or modifications carried out to the product by anyone other than a qualified Interroll representative will render this guarantee null and void unless such repairs have been previously agreed in writing by Interroll.

Exclusions

The INTERROLL guarantee excludes any liability for:

- Rubber lagging or other added materials due to normal wear or misuse
- Costs of the removal and return of the product to INTERROLL under the terms of this guarantee
- Damage to other equipment used in connection with the product
- Loss of earnings, personal injury and any other costs incurred due to the failure of the product

Declaration of incorporation

in terms of the EC-Machine Directive 2006/42/EG, Annex II 1 B

The manufacturer

Interroll Trommelmotoren GmbH
Opelstr. 3
41836 Hueckelhoven/Baal
Germany

hereby declares with sole responsibility that the product series

- Drum Motor i-series
- Drum Motor S-series
- Drum Motor E-series
- Drum Motor D-series

fully comply with the safety and health requirements of the Machinery Directive 2006/42/EC Appendix I.

The relevant technical documents according to appendix VII B are available and will be presented to the competent national authorities electronically, if required.

Person authorised to compile the technical file: Holger Hoefer, Interroll Trommelmotoren GmbH, Opelstr. 3, D-41836 Hueckelhoven

The partly completed machinery complies with the following EC directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- RoHS Directive 2002/95/EC

The following harmonised standards were applied:

- EN ISO 12100-1
- EN ISO 12100-2
- EN ISO 14121-1

Initial start-up of the partly completed machinery is not permitted until the machinery is incorporated into a machinery which complies with the machinery directive. The EC declaration of conformity must be available according to appendix II A.

Hueckelhoven/Baal, Germany, December 18th 2009

Helmut Leuver

(Managing Director)

(This declaration can be obtained at www.interroll.com, if needed.)

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